Answers to

1) quadratic monomial
2) linear binomial
3) fourth degree trinomial
4) linear monomial
5) cubic monomial
6) quadratic monomial
7) cubic binomial
8) fourth degree polynomial with four terms
9) quadratic binomial
10) sixth degree polynomial with four terms
11) $-b^4 + 9b^3 + b^2$
12) $12m^4 + 2m + 3$
13) $4n^4 + 5n^3 - 10n^2$
14) $-4x^3 + 4x^2 + 8x$
15) $-a^4 + 2a^3 + 2a^2 + 5a - 4$
16) $-2x^4 - 8x^3 - 9x^2 + 10x$
17) $-4x^3 + 6x + 6$
18) $-16a^4 - a^2 - 7$
19) $-3n^4 + 13n^3 + 2n^2 + 7n$
20) $5p^4 - 2p^3 + 14p^2 - p - 2$
21) $-9x^4 + 12x^3 - 5x^2 - 3x - 5$
22) $2x^4 + 7x^3 + 5x^2 - 14x + 5$
23) $4r + 4$
24) $-42n^3 - 14n^2$
25) $-16k - 8$
26) $56n - 35$
27) $-3n^2 + 25n - 8$
28) $35x^2 - 58x + 24$
29) $-16k^2 + 14k + 15$
30) $-21n^2 + 50n - 25$
31) $-8n^3 - 6n + 4$
32) $-18x^3 + 48x^2 - 80x + 64$
33) $-10n^3 - 34n^2 + 59n - 21$
34) $-15r^3 - 48r^2 - 39r - 6$
35) $4x^4 + 13x^3 - 12x^2 + 10x - 25$
36) $-6n^4 + 24n^3 + 8n^2 - 70n + 40$
37) $4k^4 + 16k^3 + 3k^2 + 22k - 24$
38) $-14v^4 - 8v^3 + 71v^2 - 5v - 56$
39) $36x^2 - 25$
40) $1 - 49a^4$
41) $49n^2 - 1$
42) $36x^4 - 4$
43) $64 - 16v^2$
44) $9 - 49k^2$
45) $4b^2 - 20b + 25$
46) $4v^4 + 8v^2 + 4$
47) $9n^2 + 24n + 16$
48) $36n^2 - 84n + 49$
49) $64n^2 - 112n + 49$
50) $25n^4 + 20n^2 + 4$
51) $\left.\frac{dy}{dx}\right|_{x=2} = 0$
52) $\left.\frac{dy}{dx}\right|_{x=-1} = 0$
53) $\left.\frac{dy}{dx}\right|_{x=1} = 9$
54) $\left.\frac{dy}{dx}\right|_{x=3} = 3$
55) $\left.\frac{dy}{dx}\right|_{x=-1} = 0$
56) $\left.\frac{dy}{dx}\right|_{x=-1} = 9$
57) $\left.\frac{dy}{dx}\right|_{x=-3} = -4$
58) $\left.\frac{dy}{dx}\right|_{x=-2} = \frac{2}{3}$
59) $\left.\frac{dy}{dx}\right|_{x=-1} = 2$
60) $\left.\frac{dy}{dx}\right|_{x=0} = -\frac{\sqrt{6}}{4}$
61) $\left.\frac{dy}{dx}\right|_{x=-1} = 0$
62) $\left.\frac{dy}{dx}\right|_{x=-2} = 0$
63) $\left.\frac{dy}{dx}\right|_{x=-1} = \frac{1}{4}$
64) $\left.\frac{dy}{dx}\right|_{x=-2} = -\frac{\sqrt[3]{2}}{3}$
65) $\left.\frac{dy}{dx}\right|_{x=1} = -1$
66) $\left.\frac{dy}{dx}\right|_{x=3} = 1$
67) $\left.\frac{dy}{dx}\right|_{x=3} = 9$
68) $\left.\frac{dy}{dx}\right|_{x=3} = 0$
69) $\left.\frac{dy}{dx}\right|_{x=-1} = -\frac{2}{9}$
70) $\left.\frac{dy}{dx}\right|_{x=-1} = \frac{2}{3}$
71) $y = 7x - 23$
72) $y = \frac{1}{2}x - \frac{5}{2}$
73) $y = 1$
74) $y = -\frac{1}{3}x + 1$
75) $y = \frac{3}{32}x - \frac{13}{32}$
76) $y = -1$
77) $y = 3x - 14$
78) $y = 4$
79) $y = 1$
80) $y = \frac{1}{2}x - 2$
81) $y = \frac{1}{2}x + 2$
82) $y = \frac{4}{9}x + \frac{10}{9}$
83) $y = \frac{2}{9}x + \frac{8}{9}$
84) $y = 8x + 5$
85) $y = x - 4$
86) $y = 2$
87) $y = -\frac{2}{3}x + 2$
88) $y = -4$
89) $y = 4x + 14$
90) $y = -1$
91) $(-\pi, 1), (0, -1), (\pi, 1)$
92) $(-2, 1), (0, 0)$
93) $\left(-\frac{\pi}{2}, 1\right), \left(\frac{\pi}{2}, -1\right)$
94) $\left(-\frac{3\pi}{4}, 1\right), \left(-\frac{\pi}{4}, -1\right), \left(\frac{\pi}{4}, 1\right), \left(\frac{3\pi}{4}, -1\right)$
95) $\left(-\frac{3\pi}{4}, 2\right), \left(-\frac{\pi}{4}, -2\right), \left(\frac{\pi}{4}, 2\right), \left(\frac{3\pi}{4}, -2\right)$
96) $\left(0, -\frac{1}{2}\right)$
97) $\left(0, \frac{1}{2}\right)$
98) $(-2, -5)$
99) $\left(-5, -\frac{5}{2}\right), \left(5, \frac{5}{2}\right)$

100) $(0, 2), \left(\frac{4}{3}, \frac{86}{27}\right)$

101) $(-3, 2)$

102) $(1, -4)$

103) $(-2, 1), (2, -1)$

104) $(-2, 4)$

105) $(0, -1)$

106) $(-4, -5), \left(-\frac{4}{3}, \frac{121}{27}\right)$

107) $(-\pi, -1), \left(-\frac{\pi}{2}, 1\right), (0, -1), \left(\frac{\pi}{2}, 1\right), (\pi, -1)$

108) $(0, -3)$

109) $(-4, 2), (4, -2)$

110) $\left(-\frac{\pi}{2}, -1\right), \left(\frac{\pi}{2}, 1\right)$

111) $3x^5 + x^4 + 4x^3$

112) $x + \frac{3}{10} + \frac{2}{x}$

113) $\frac{p^4}{4} + \frac{5p^3}{8} + 5p^2$

114) $3x + 1 + \frac{1}{x}$

115) $3x^2 + \frac{x}{2} + 3$

116) $\frac{n^2}{2} + 2n + \frac{3}{4}$

117) $\frac{2}{3} + \frac{1}{2n} + \frac{5}{6n^2}$

118) $\frac{2x}{9} + \frac{1}{3} + \frac{3}{x}$

119) $4a^5 + a^4 + \frac{5a^3}{4}$

120) $\frac{3}{4} + \frac{2}{v} + \frac{1}{v^2}$

121) $5x + 1 + \frac{9}{x - 7}$

122) $6k + 7 + \frac{1}{k - 4}$

123) $2r - 3 - \frac{10}{r + 3}$

124) $8x - 10 - \frac{1}{x + 7}$

125) $2n - 1 + \frac{8}{n - 4}$

126) $5k + 7 - \frac{6}{k - 9}$

127) $2v - 10 + \frac{8}{v - 10}$

128) $9x - 2 + \frac{8}{x - 4}$

129) $n - 6 + \frac{8}{n - 8}$

130) $2a + 2 + \frac{6}{a - 9}$

131) $7k^3 - 6k^2 + 3k + 6 - \frac{2}{-7 + 5k}$

132) $n^3 + 6n^2 + 3n + 6 - \frac{5}{2n + 8}$

133) $5p^3 + 7 + \frac{6}{4p - 3}$

134) $v^3 + 9v^2 + 4v - 1 - \frac{10}{7 + 9v}$

135) $a^3 - 5a + 10 + \frac{5}{6 + 3a}$

136) $a^3 + a^2 - 2a - 9 + \frac{3}{a - 8}$

137) $x^3 - 2x^2 + 5x + 5 + \frac{1}{4x + 7}$

138) $x^3 - 5x^2 + 9x + 1 - \frac{1}{8 + 10x}$

139) $b^3 + 7b^2 + 6b + 1 + \frac{6}{8b + 5}$

140) $a^3 - 2a^2 + 8a + 3 + \frac{9}{5a + 7}$

141) $n^4 - 10n^3 + 2n^2 + 5n + 6 - \frac{1}{5n - 4}$

142) $x^4 + 3x^3 + 9x^2 - 7x - 1 - \frac{3}{-7 + 6x}$

143) $x^4 - 7x^3 + 10x^2 + x - 2 - \frac{3}{2x + 2}$

144) $p^4 - 3p^3 + 7p^2 + 6p + 2 + \frac{2}{5p - 3}$

145) $2x^4 + 2x^3 + 5 + \frac{1}{3x + 3}$

146) $n^4 + 2n^3 + 2n^2 + 2n + 5 + \frac{3}{6n - 7}$

147) $6x^4 - 3x^3 + 5x^2 + 10x - 10 + \frac{4}{3x + 5}$

148) $x^4 - x^3 - x^2 + 5x + 9 + \frac{6}{3x + 5}$

149) $n^4 - 4n^3 + 7n^2 + \frac{5}{6n - 9}$

150) $x^4 + 6x^3 + x^2 + 6x + 1 + \frac{8}{5x + 2}$

151) $5n - 5$

152) $5k + 9$

153) $2x + 5$

154) $-7x - 7$

155) $6x - 4$

156) $3b + 2$

157) $9x + 10$

158) $2v - 10$

159) $3n + 2$

160) $10n + 10$

161) $9n - 6$

162) $4k + 4$

163) $3a + 4$

164) $10a - 2$

165) $2k$

166) $10n$

167) $9x$

168) $2m + 2$

169) $9a - 9$

170) $8x + 5$

171) $p^2 + 9p + 3$

172) $8x^2 + 7x + 7$

173) $p^2 + 10p + 6$

174) $3x^2 - 8x + 2$

175) $10r^2 + 7r + 7$

176) $r^2 - 3r$

177) $n^2 + 10n - 4$

178) $k^2 + 7k$

179) $2m^2 + 8m$

180) $10r^2 + 6r - 3$

181) $x^4 + x^3 - 8x^2 + 10x + 3$

182) $r^4 - 8r^3 + 3r^2 - 8r + 3$

183) $n^4 + 10n + 6$

184) $x^4 - 3x^3 - 7x^2 - 7x + 1$

185) $x^4 + 3$

186) $4n^4 + 5n^3 + 5n^2 + 6n + 2$

187) $p^4 - 6$

188) $p^4 - 4p^3 + 3p^2 - 10p - 9$

189) $x^4 + 9x + 7$

190) $m^4 + 2m^3 - 4m^2 + m + 6$

191) $\{0, -1, 5\}$

192) $\{0, 5, -4\}$

193) $\{0, -5, -3\}$ 194) $\{0, -1, -5\}$ 195) $\{0, -5, 1\}$ 196) $\{0, -4, -3\}$

197) $\{0, -1, 4\}$ 198) $\{0, 5, -2\}$ 199) $\{0, 4, 2\}$ 200) $\{0, 5, -3\}$

201) $\left\{-1, \frac{1 + i\sqrt{3}}{2}, \frac{1 - i\sqrt{3}}{2}\right\}$ 202) $\{3 + \sqrt{5}, 3 - \sqrt{5}\}$ 203) $\{1 + 2i, 1 - 2i\}$

204) $\{i\sqrt{2}, -i\sqrt{2}, i\sqrt{6}, -i\sqrt{6}\}$

205) $\{2, -1 + i\sqrt{3}, -1 - i\sqrt{3}, -2, 1 + i\sqrt{3}, 1 - i\sqrt{3}\}$

206) $\{0, 3, \sqrt{2}, -\sqrt{2}\}$ 207) $\{-4, 3\}$ 208) $\{0, 3, -4\}$

209) $\{i\sqrt{3}, -i\sqrt{3}, \sqrt{5}, -\sqrt{5}, i\sqrt{5}, -i\sqrt{5}\}$ 210) $\{3, -3, 2, -2\}$ 211) $\{4, 3\}$

212) $\{-1 + \sqrt{43}, -1 - \sqrt{43}\}$ 213) $\{i\sqrt{5}, -i\sqrt{5}, 3i, -3i\}$

214) $\left\{-3, \frac{3 + 3i\sqrt{3}}{2}, \frac{3 - 3i\sqrt{3}}{2}, -1, \frac{1 + i\sqrt{3}}{2}, \frac{1 - i\sqrt{3}}{2}\right\}$

215) $\{-4, i\sqrt{2}, -i\sqrt{2}\}$ 216) $\{0, 2, -5\}$ 217) $\left\{3, \frac{-3 + 3i\sqrt{3}}{2}, \frac{-3 - 3i\sqrt{3}}{2}\right\}$

218) $\{5, 2i, -2i\}$ 219) $\{1, -1, 2i\sqrt{2}, -2i\sqrt{2}\}$

220) $\{2i\sqrt{2}, -2i\sqrt{2}, \sqrt{2}, -\sqrt{2}\}$ 221) $\{0, i\sqrt{7}, -i\sqrt{7}, 3i, -3i\}$

222) $\{\sqrt{3}, -\sqrt{3}, i\sqrt{5}, -i\sqrt{5}\}$ 223) $\{-3 + i, -3 - i\}$

224) $\left\{1, \frac{-1 + i\sqrt{3}}{2}, \frac{-1 - i\sqrt{3}}{2}, -5, \frac{5 + 5i\sqrt{3}}{2}, \frac{5 - 5i\sqrt{3}}{2}\right\}$

225) $\{-4, i, -i\}$ 226) $\{-4 + \sqrt{41}, -4 - \sqrt{41}\}$ 227) $\{0, 1 + 2i, 1 - 2i\}$

228) $\{3i, -3i, 2i\sqrt{2}, -2i\sqrt{2}\}$ 229) $\{-2 \text{ mult. } 2\}$ 230) $\{4, -4\}$

231) $(3 + x)(9 - 3x + x^2)$ 232) $(1 - a)(1 + a + a^2)$ 233) $(2 + x)(4 - 2x + x^2)$

234) $(x - 4)(x^2 + 4x + 16)$ 235) $(x - 3)(x^2 + 3x + 9)$ 236) $(3 - x)(9 + 3x + x^2)$

237) $(4 + x)(16 - 4x + x^2)$ 238) $(a + 1)(a^2 - a + 1)$ 239) $(x - 5)(x^2 + 5x + 25)$

240) $(5 + x)(25 - 5x + x^2)$ 241) $(-3x - 4)(9x^2 - 12x + 16)$

242) $(-6u - 7)(36u^2 - 42u + 49)$ 243) $(-3 + 5x)(9 + 15x + 25x^2)$

244) $(4a - 3)(16a^2 + 12a + 9)$ 245) $(m - 3)(m^2 + 3m + 9)$ 246) $(5m + 1)(25m^2 - 5m + 1)$

247) $3u(u + 7)(u^2 - 7u + 49)$ 248) $(1 + 5x)(1 - 5x + 25x^2)$

249) $m(7m - 5)(49m^2 + 35m + 25)$ 250) $3x(7 - x)(49 + 7x + x^2)$

251) $x(3x - 4)(9x^2 + 12x + 16)$ 252) $(5m - 1)(25m^2 + 5m + 1)$ 253) $(7u + 6)(49u^2 - 42u + 36)$

254) $x(7 - 4x)(49 + 28x + 16x^2)$ 255) $x^2(4x + 5)(16x^2 - 20x + 25)$

256) $(1 - 6x)(1 + 6x + 36x^2)$ 257) $(6 - 5x)(36 + 30x + 25x^2)$ 258) $(-6 - x)(36 - 6x + x^2)$

259) $m^2(6m + 5)(36m^2 - 30m + 25)$ 260) $4x(6 + 5x)(36 - 30x + 25x^2)$

261) $x(-5x^2 - 3y^2)(25x^4 - 15x^2y^2 + 9y^4)$ 262) $(5m^2 - 7n^2)(25m^4 + 35m^2n^2 + 49n^4)$

263) $m(2m^2 + 5n^2)(4m^4 - 10m^2n^2 + 25n^4)$ 264) $y^2(2x^2 - 5y^2)(4x^4 + 10x^2y^2 + 25y^4)$

265) $4b(4a^2 - 5b^2)(16a^4 + 20a^2b^2 + 25b^4)$ 266) $b(5u^2 - 4v^2)(25u^4 + 20u^2v^2 + 16v^4)$

267) $4y(x^2 - 2y^2)(x^4 + 2x^2y^2 + 4y^4)$ 268) $(-6a^2 + 7b^2)(36a^4 + 42a^2b^2 + 49b^4)$

269) $(5x^2 - 4y^2)(25x^4 + 20x^2y^2 + 16y^4)$ 270) $(3a^2 - 7b^2)(9a^4 + 21a^2b^2 + 49b^4)$

271) $2y(-7x^2 + 6y^2)(49x^4 + 42x^2y^2 + 36y^4)$ 272) $(x^2 - 5y^2)(x^4 + 5x^2y^2 + 25y^4)$

273) $4x(2m^2 + 5n^2)(4m^4 - 10m^2n^2 + 25n^4)$ 274) $a(x - 2y)(x + 2y)(x^4 + 4x^2y^2 + 16y^4)$

275) $(-3m^2 + 4n^2)(9m^4 + 12m^2n^2 + 16n^4)$ 276) $4k^2(-4m^2 - 5n^2)(16m^4 - 20m^2n^2 + 25n^4)$

277) $(4x^2 + 3y^2)(16x^4 - 12x^2y^2 + 9y^4)$ 278) $u(-2u^2 + 5v^2)(4u^4 + 10u^2v^2 + 25v^4)$

279) $(2x^2 + 7y^2)(4x^4 - 14x^2y^2 + 49y^4)$ 280) $px(-7x^2 - 3y^2)(49x^4 - 21x^2y^2 + 9y^4)$

281) Possible rational zeros:
$0, \pm 1, \pm 2, \pm 4, \pm 5, \pm 10, \pm 20$
Factors to: $f(x) = x(x + 4)(x - 5)$
Zeros: $\{0, -4, 5\}$

282) Possible rational zeros: $0, \pm 1, \pm 5, \pm 25$
Factors to: $f(x) = x(x - 5)^2$
Zeros: $\{0, 5 \text{ mult. } 2\}$

283) Possible rational zeros: $0, \pm 1, \pm 3, \pm 5, \pm 15$
Factors to: $f(x) = x(x-5)(x+3)$
Zeros: $\{0, 5, -3\}$

284) Possible rational zeros: $0, \pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12$
Factors to: $f(x) = x(x+3)(x+4)$
Zeros: $\{0, -3, -4\}$

285) Possible rational zeros: $0, \pm 1, \pm 3, \pm 5, \pm 15$
Factors to: $f(x) = x(x+3)(x+5)$
Zeros: $\{0, -3, -5\}$

286) Possible rational zeros: $0, \pm 1, \pm 3, \pm 5, \pm 15$
Factors to: $f(x) = x(x+5)(x-3)$
Zeros: $\{0, -5, 3\}$

287) Possible rational zeros: $\pm 1, \pm 7$
Factors to: $f(x) = (x+7)(x-1)^2$
Zeros: $\{-7, 1 \text{ mult. } 2\}$

288) Possible rational zeros: $\pm 1, \pm 5$
Factors to: $f(x) = (x+5)(x-1)(x+1)$
Zeros: $\{-5, 1, -1\}$

289) Possible rational zeros: $\pm 1, \pm 7$
Factors to: $f(x) = (x-1)(x-7)(x+1)$
Zeros: $\{1, 7, -1\}$

290) Possible rational zeros: $\pm 1, \pm 11$
Factors to: $f(x) = (x+11)(x+1)(x-1)$
Zeros: $\{-11, -1, 1\}$

291) Possible rational zeros: $\pm 1, \pm 2$
Factors to: $f(x) = (x+2)(x-1)^2$
Zeros: $\{-2, 1 \text{ mult. } 2\}$

292) Possible rational zeros: $\pm 1, \pm 2$
Factors to: $f(x) = (x-2)(x+1)^2$
Zeros: $\{2, -1 \text{ mult. } 2\}$

293) Possible rational zeros: $\pm 1, \pm 2$
Factors to: $f(x) = (x-1)^2(x-2)$
Zeros: $\{1 \text{ mult. } 2, 2\}$

294) Possible rational zeros: $\pm 1, \pm 7$
Factors to: $f(x) = (x-1)^2(x-7)$
Zeros: $\{1 \text{ mult. } 2, 7\}$

295) Possible rational zeros: $\pm 1, \pm 2$
Factors to: $f(x) = (x+1)^2(x+2)$
Zeros: $\{-1 \text{ mult. } 2, -2\}$

296) Possible rational zeros: $\pm 1, \pm 3$
Factors to: $f(x) = (x+3)(x+1)^2$
Zeros: $\{-3, -1 \text{ mult. } 2\}$

297) Possible rational zeros: $0, \pm 1, \pm 3$
Zeros: $\{0, -3, 1 \text{ mult. } 2\}$

298) Possible rational zeros: $0, \pm 1, \pm 13$
Zeros: $\{0, -13, 1, -1\}$

299) Possible rational zeros: $0, \pm 1, \pm 5$
Zeros: $\{0, -5, -1 \text{ mult. } 2\}$

300) Possible rational zeros: $0, \pm 1, \pm 2$
Zeros: $\{0, 2, -1 \text{ mult. } 2\}$

301) Possible rational zeros: $0, \pm 1, \pm 7$
Zeros: $\{0, 7, -1 \text{ mult. } 2\}$

302) Possible rational zeros: $0, \pm 1, \pm 13$
Zeros: $\{0, 1 \text{ mult. } 2, -13\}$

303) Possible rational zeros: $0, \pm 1, \pm 5$
Zeros: $\{0, 1 \text{ mult. } 2, 5\}$

304) Possible rational zeros: $0, \pm 1, \pm 7$
Zeros: $\{0, -7, 1, -1\}$

305) Possible rational zeros: $0, \pm 1, \pm 13$
Zeros: $\{0, 13, -1 \text{ mult. } 2\}$

306) Possible rational zeros: $0, \pm 1, \pm 3$
Zeros: $\{0, 3, 1 \text{ mult. } 2\}$

307) $(x+1)(x-1)(x-2)(x+3)$

308) $(x+1)(x+2)(x-2)(x+3)$

309) $(x+2)(x+4)(x-3)(x+3)$

310) $(x+3)(x+4)(x+5)(x+6)$

311) $(x+3)^4$

312) $(x+2)^2 \cdot (x+3)^2$

313) $(x-5)^2(x-6)(x-7)$

314) $(x-3)(x+3)(x-4)(x+4)$

315) $(2x-1)(x+1)(x-4)(x+4)$

316) $(2x+1)(x-1)(x+3)(x-6)$

317) $(2x+3)(x-3)(x+3)(x-5)$

318) $(3x+2)(x-2)^2(x+2)$

319) $(5x+1)(x+5)^2(x-3)$

320) $(2x+1)(2x-1)(x+2)(x+3)$

321) $(3x+1)(2x-3)(x-1)(x+3)$

322) $(3x+1)^2(x-3)(x+3)$

323) $(3x+2)(3x-2)(x+3)(x-3)$

324) $(2x+1)(2x-1)(3x-1)(3x+2)$

325) $(2x+1)^2(3x-5)(3x+2)$

326) $(2x+3)(2x-5)(5x-1)(3x+7)$

327) $\{2\}$

328) $\{2\}$

329) $\{-3\}$

330) $\{4\}$

331) $\{1\}$

332) $\{1\}$

333) $\{3\}$

334) $\{3\}$

335) $\{-1\}$

336) $\{-3\}$

337) $\left\{\frac{1-\sqrt{13}}{3}, \frac{1+\sqrt{13}}{3}\right\}$

338) $\left\{\frac{1+\sqrt{13}}{3}, \frac{1-\sqrt{13}}{3}\right\}$

339) $\left\{\frac{4-\sqrt{19}}{3}, \frac{4+\sqrt{19}}{3}\right\}$

340) $\left\{\frac{4-\sqrt{19}}{3}, \frac{4+\sqrt{19}}{3}\right\}$

341) $\left\{\frac{2+\sqrt{7}}{3}, \frac{2-\sqrt{7}}{3}\right\}$ 342) $\left\{\frac{1-\sqrt{13}}{3}, \frac{1+\sqrt{13}}{3}\right\}$ 343) $\left\{\frac{3+2\sqrt{3}}{3}, \frac{3-2\sqrt{3}}{3}\right\}$

344) $\left\{\frac{1+\sqrt{13}}{3}, \frac{1-\sqrt{13}}{3}\right\}$ 345) $\left\{\frac{1+\sqrt{13}}{3}, \frac{1-\sqrt{13}}{3}\right\}$ 346) $\left\{\frac{3+2\sqrt{3}}{3}, \frac{3-2\sqrt{3}}{3}\right\}$

347) $\left\{-\frac{5}{2}\right\}$ 348) $\left\{-\frac{3}{2}\right\}$ 349) $\left\{\frac{3}{2}\right\}$ 350) $\{1\}$

351) $\{1\}$ 352) $\{0\}$ 353) $\{3\}$ 354) $\{1\}$

355) $\left\{\frac{11}{2}\right\}$ 356) $\left\{\frac{5}{2}\right\}$ 357) Increasing: $(1, \infty)$ Decreasing: $(-\infty, 1)$

358) Increasing: $(-4, \infty)$ Decreasing: $(-\infty, -4)$ 359) Increasing: $(-2, \infty)$ Decreasing: $(-\infty, -2)$

360) Increasing: $(-\infty, 3)$ Decreasing: $(3, \infty)$ 361) Increasing: $(-3, \infty)$ Decreasing: $(-\infty, -3)$

362) Increasing: $(4, \infty)$ Decreasing: $(-\infty, 4)$ 363) Increasing: $(-3, \infty)$ Decreasing: $(-\infty, -3)$

364) Increasing: $(-\infty, -4)$ Decreasing: $(-4, \infty)$ 365) Increasing: $(3, \infty)$ Decreasing: $(-\infty, 3)$

366) Increasing: $(-\infty, 1)$ Decreasing: $(1, \infty)$

367) Increasing: $(-\infty, 0), \left(\frac{2}{3}, \infty\right)$ Decreasing: $\left(0, \frac{2}{3}\right)$

368) Increasing: $(-\infty, 2), \left(\frac{8}{3}, \infty\right)$ Decreasing: $\left(2, \frac{8}{3}\right)$

369) Increasing: $\left(0, \frac{2}{3}\right)$ Decreasing: $(-\infty, 0), \left(\frac{2}{3}, \infty\right)$

370) Increasing: $(-\infty, 2), \left(\frac{10}{3}, \infty\right)$ Decreasing: $\left(2, \frac{10}{3}\right)$

371) Increasing: $\left(0, \frac{8}{3}\right)$ Decreasing: $(-\infty, 0), \left(\frac{8}{3}, \infty\right)$

372) Increasing: $(-\infty, 0), (1, 2)$ Decreasing: $(0, 1), (2, \infty)$

373) Increasing: $\left(-\frac{\sqrt{2}}{2}, 0\right), \left(\frac{\sqrt{2}}{2}, \infty\right)$ Decreasing: $\left(-\infty, -\frac{\sqrt{2}}{2}\right), \left(0, \frac{\sqrt{2}}{2}\right)$

374) Increasing: $(-\infty, -\sqrt{2}), (0, \sqrt{2})$ Decreasing: $(-\sqrt{2}, 0), (\sqrt{2}, \infty)$

375) Increasing: $\left(-\infty, -\frac{\sqrt{2}}{2}\right), \left(0, \frac{\sqrt{2}}{2}\right)$ Decreasing: $\left(-\frac{\sqrt{2}}{2}, 0\right), \left(\frac{\sqrt{2}}{2}, \infty\right)$

376) Increasing: $\left(-\frac{\sqrt{6}}{2}, 0\right), \left(\frac{\sqrt{6}}{2}, \infty\right)$ Decreasing: $\left(-\infty, -\frac{\sqrt{6}}{2}\right), \left(0, \frac{\sqrt{6}}{2}\right)$

377) Increasing: $\left(-\frac{3\sqrt{5}}{5}, \frac{3\sqrt{5}}{5}\right)$ Decreasing: $\left(-\infty, -\frac{3\sqrt{5}}{5}\right), \left(\frac{3\sqrt{5}}{5}, \infty\right)$

378) Increasing: $\left(-\infty, -\frac{\sqrt{30}}{5}\right), \left(\frac{\sqrt{30}}{5}, \infty\right)$ Decreasing: $\left(-\frac{\sqrt{30}}{5}, \frac{\sqrt{30}}{5}\right)$

379) Increasing: $\left(-\infty, -\frac{\sqrt{30}}{5}\right), \left(\frac{\sqrt{30}}{5}, \infty\right)$ Decreasing: $\left(-\frac{\sqrt{30}}{5}, \frac{\sqrt{30}}{5}\right)$

380) Increasing: $\left(-\infty, -\frac{3\sqrt{5}}{5}\right), \left(\frac{3\sqrt{5}}{5}, \infty\right)$ Decreasing: $\left(-\frac{3\sqrt{5}}{5}, \frac{3\sqrt{5}}{5}\right)$

381) Increasing: $\left(-\infty, -\frac{\sqrt{30}}{5}\right), \left(\frac{\sqrt{30}}{5}, \infty\right)$ Decreasing: $\left(-\frac{\sqrt{30}}{5}, \frac{\sqrt{30}}{5}\right)$

382) Concave up: $(-\infty, \infty)$ Concave down: No intervals exist.

383) Concave up: $(-\infty, \infty)$ Concave down: No intervals exist.

384) Concave up: No intervals exist. Concave down: $(-\infty, \infty)$

385) Concave up: $(-\infty, \infty)$ Concave down: No intervals exist.
386) Concave up: $(-\infty, \infty)$ Concave down: No intervals exist.
387) Concave up: $(-\infty, \infty)$ Concave down: No intervals exist.
388) Concave up: $(-\infty, \infty)$ Concave down: No intervals exist.
389) Concave up: $(-\infty, \infty)$ Concave down: No intervals exist.
390) Concave up: $(-\infty, \infty)$ Concave down: No intervals exist.
391) Concave up: No intervals exist. Concave down: $(-\infty, \infty)$
392) Concave up: $(4, \infty)$ Concave down: $(-\infty, 4)$
393) Concave up: $\left(\frac{4}{3}, \infty\right)$ Concave down: $\left(-\infty, \frac{4}{3}\right)$
394) Concave up: $\left(\frac{1}{3}, \infty\right)$ Concave down: $\left(-\infty, \frac{1}{3}\right)$
395) Concave up: $(-3, \infty)$ Concave down: $(-\infty, -3)$
396) Concave up: $\left(\frac{4}{3}, \infty\right)$ Concave down: $\left(-\infty, \frac{4}{3}\right)$
397) Concave up: $\left(\frac{3-\sqrt{105}}{12}, \frac{3+\sqrt{105}}{12}\right)$ Concave down: $\left(-\infty, \frac{3-\sqrt{105}}{12}\right), \left(\frac{3+\sqrt{105}}{12}, \infty\right)$
398) Concave up: $\left(-\infty, \frac{-3-\sqrt{105}}{12}\right), \left(\frac{-3+\sqrt{105}}{12}, \infty\right)$ Concave down: $\left(\frac{-3-\sqrt{105}}{12}, \frac{-3+\sqrt{105}}{12}\right)$
399) Concave up: $(-\infty, -1), \left(\frac{1}{2}, \infty\right)$ Concave down: $\left(-1, \frac{1}{2}\right)$
400) Concave up: $\left(-\infty, \frac{6-\sqrt{6}}{6}\right), \left(\frac{6+\sqrt{6}}{6}, \infty\right)$ Concave down: $\left(\frac{6-\sqrt{6}}{6}, \frac{6+\sqrt{6}}{6}\right)$
401) Concave up: $\left(\frac{-3-\sqrt{105}}{12}, \frac{-3+\sqrt{105}}{12}\right)$ Concave down: $\left(-\infty, \frac{-3-\sqrt{105}}{12}\right), \left(\frac{-3+\sqrt{105}}{12}, \infty\right)$
402) Concave up: $\left(-\frac{3\sqrt{10}}{10}, 0\right), \left(\frac{3\sqrt{10}}{10}, \infty\right)$ Concave down: $\left(-\infty, -\frac{3\sqrt{10}}{10}\right), \left(0, \frac{3\sqrt{10}}{10}\right)$
403) Concave up: $\left(-\frac{3\sqrt{10}}{10}, 0\right), \left(\frac{3\sqrt{10}}{10}, \infty\right)$ Concave down: $\left(-\infty, -\frac{3\sqrt{10}}{10}\right), \left(0, \frac{3\sqrt{10}}{10}\right)$
404) Concave up: $\left(-\frac{3\sqrt{10}}{10}, 0\right), \left(\frac{3\sqrt{10}}{10}, \infty\right)$ Concave down: $\left(-\infty, -\frac{3\sqrt{10}}{10}\right), \left(0, \frac{3\sqrt{10}}{10}\right)$
405) Concave up: $\left(-\infty, -\frac{\sqrt{15}}{5}\right), \left(0, \frac{\sqrt{15}}{5}\right)$ Concave down: $\left(-\frac{\sqrt{15}}{5}, 0\right), \left(\frac{\sqrt{15}}{5}, \infty\right)$
406) Concave up: $\left(-\frac{\sqrt{15}}{5}, 0\right), \left(\frac{\sqrt{15}}{5}, \infty\right)$ Concave down: $\left(-\infty, -\frac{\sqrt{15}}{5}\right), \left(0, \frac{\sqrt{15}}{5}\right)$
407) Relative minimum: $\left(\frac{8}{3}, -\frac{121}{27}\right)$
Relative maximum: $(0, 5)$
408) Relative minimum: $(0, -6)$
Relative maximum: $\left(\frac{8}{3}, \frac{94}{27}\right)$
409) Relative minimum: $(0, 1)$
Relative maxima: $\left(-\frac{\sqrt{6}}{2}, \frac{13}{4}\right), \left(\frac{\sqrt{6}}{2}, \frac{13}{4}\right)$
410) Relative minimum: $(-1, -1)$
No relative maxima.
411) Relative minimum: $\left(\frac{11}{3}, -\frac{85}{27}\right)$
Relative maximum: $(3, -3)$
412) Relative minimum: $(3, -2)$
Relative maximum: $(1, 2)$

413) Relative minima: $\left(-\frac{\sqrt{6}}{2}, -\frac{9}{4}\right), \left(\frac{\sqrt{6}}{2}, -\frac{9}{4}\right)$
Relative maximum: $(0, 0)$

414) Relative minima: $(-\sqrt{2}, 1), (\sqrt{2}, 1)$
Relative maximum: $(0, 5)$

415) Relative minimum: $(-3, 2)$
No relative maxima.

416) Relative minimum: $(0, -4)$
Relative maximum: $(2, 0)$

417) Relative minimum: $(0, -3)$
Relative maximum: $\left(\frac{2}{3}, -\frac{77}{27}\right)$

418) Relative minimum: $(-2, -3)$
Relative maximum: $(-4, 1)$

419) Relative minimum: $(0, -3)$
Relative maxima: $(-1, -2), (1, -2)$

420) No relative minima.
Relative maximum: $(0, 1)$

421) No relative minima.
Relative maximum: $(-1, -1)$

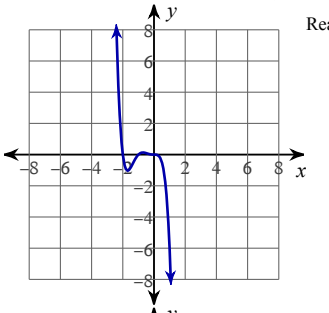
422) Relative minima: $(-\sqrt{2}, -1), (\sqrt{2}, -1)$
Relative maximum: $(0, 3)$

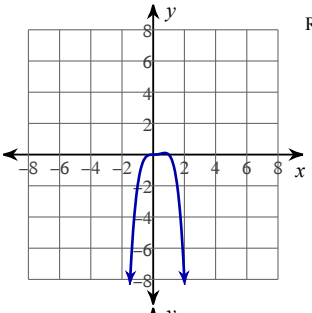
423) Relative minima: $(-\sqrt{2}, -2), (\sqrt{2}, -2)$
Relative maximum: $(0, 2)$

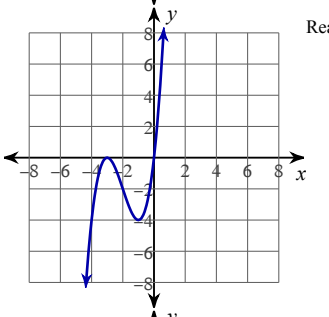
424) Relative minimum: $(4, 0)$
No relative maxima.

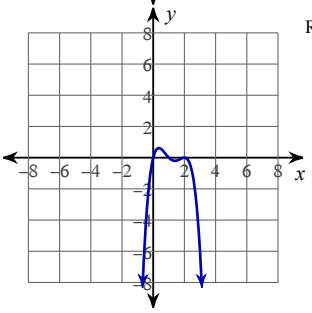
425) Relative minimum: $\left(-\frac{7}{3}, -\frac{175}{27}\right)$
Relative maximum: $(-5, 3)$

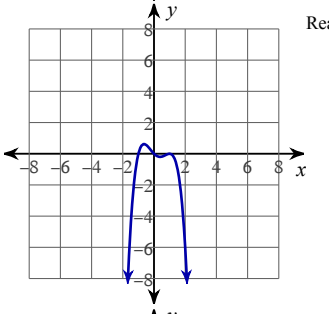
426) Relative minimum: $\left(\frac{4}{3}, -\frac{140}{27}\right)$
Relative maximum: $(0, -4)$

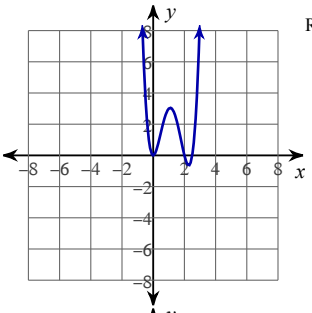
427) 
Real zeros: {0 mult. 3, −2, −1}

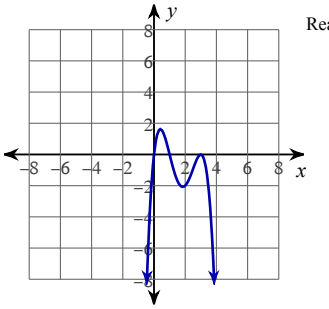
428) 
Real zeros: {0 mult. 3, 1}

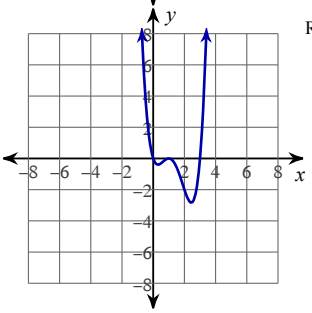
429) 
Real zeros: {0, −3 mult. 2}

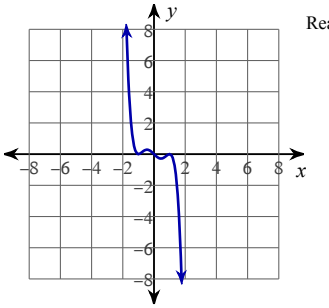
430) 
Real zeros: {0, 2 mult. 2, 1}

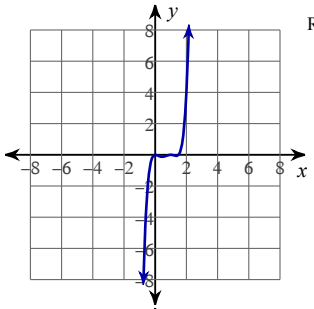
431) 
Real zeros: {0, 1 mult. 2, −1}

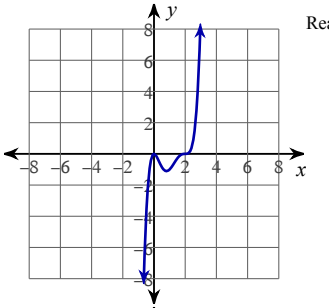
432) 
Real zeros: $\left\{0 \text{ mult. } 2, 2, \frac{5}{2}\right\}$

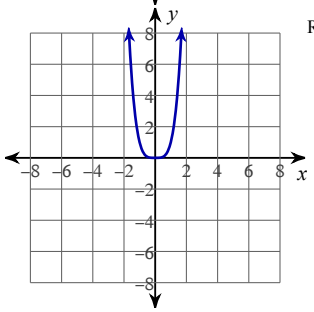
433) 
Real zeros: {0, 3 mult. 2, 1}

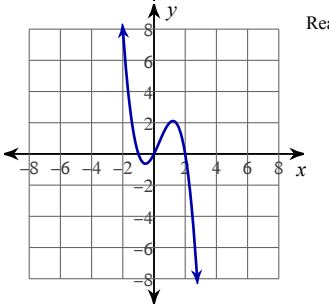
434) 
Real zeros: {0, 3, 1 mult. 2}

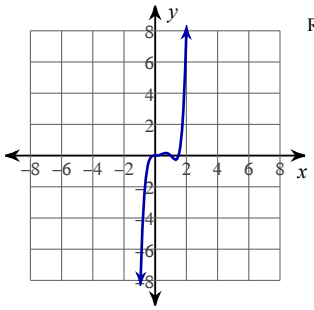
435)  Real zeros: $\{0,\ 1 \text{ mult. } 2,\ -1 \text{ mult. } 2\}$

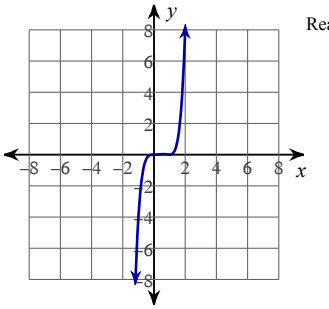
436)  Real zeros: $\left\{0 \text{ mult. } 2,\ 1 \text{ mult. } 2,\ \frac{3}{2}\right\}$

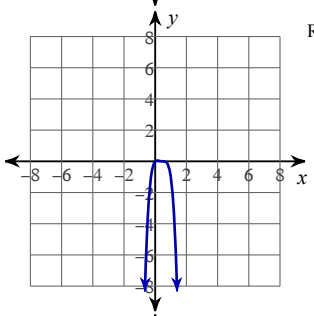
437)  Real zeros: $\{0 \text{ mult. } 2,\ 2 \text{ mult. } 3\}$

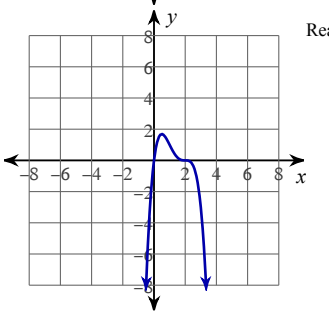
438)  Real zeros: $\{0 \text{ mult. } 4\}$

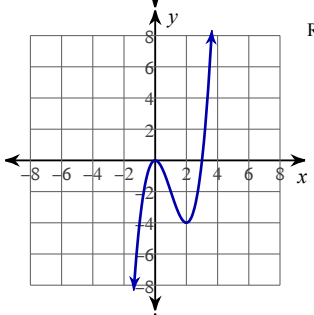
439)  Real zeros: $\{0,\ 2,\ -1\}$

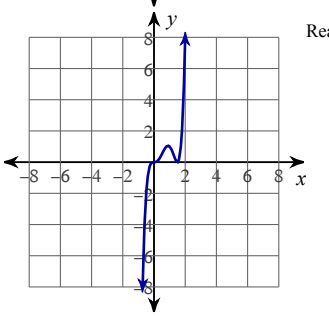
440)  Real zeros: $\left\{0 \text{ mult. } 3,\ 1,\ \frac{3}{2}\right\}$

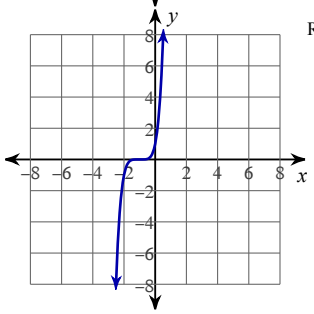
441)  Real zeros: $\{0 \text{ mult. } 3,\ 1 \text{ mult. } 2\}$

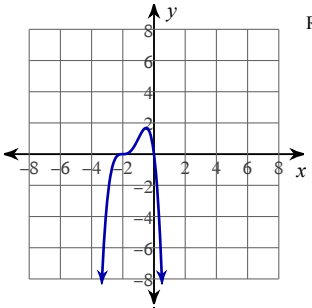
442)  Real zeros: $\left\{0,\ \frac{1}{2} \text{ mult. } 3\right\}$

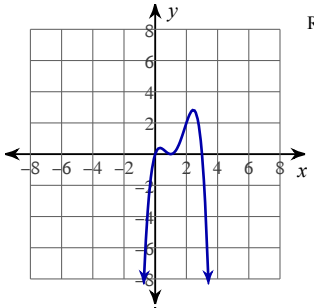
443)  Real zeros: $\{0,\ 2 \text{ mult. } 3\}$

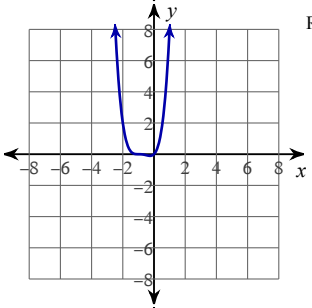
444)  Real zeros: $\{0 \text{ mult. } 2,\ 3\}$

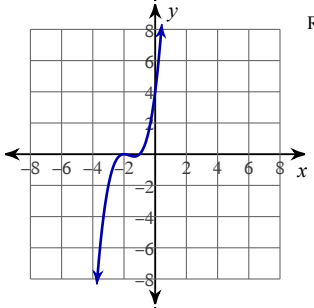
445)  Real zeros: $\left\{0 \text{ mult. } 3,\ \frac{3}{2} \text{ mult. } 2\right\}$

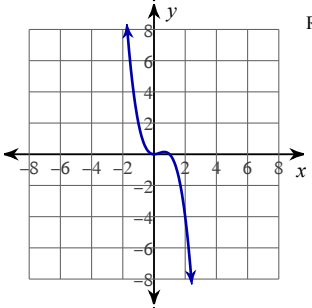
446)  Real zeros: $\{-1 \text{ mult. } 5\}$

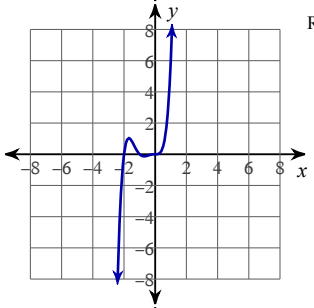
447)  Real zeros: {0, −2 mult. 3}

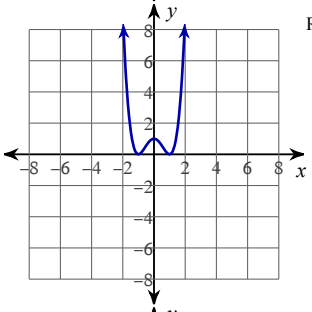
448)  Real zeros: {0, 3, 1 mult. 2}

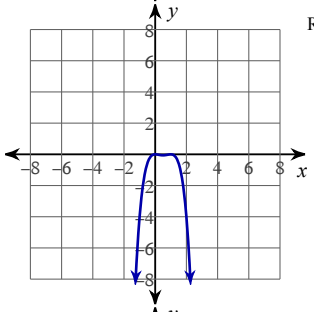
449)  Real zeros: {0, −1 mult. 3}

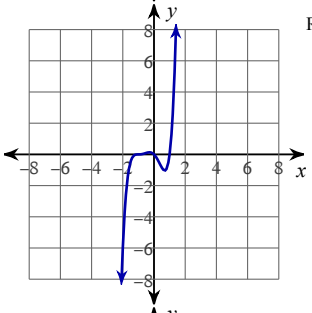
450)  Real zeros: {−2 mult. 2, −1}

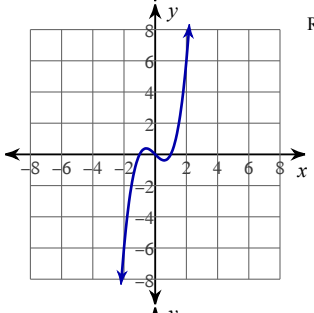
451)  Real zeros: {0 mult. 2, 1}

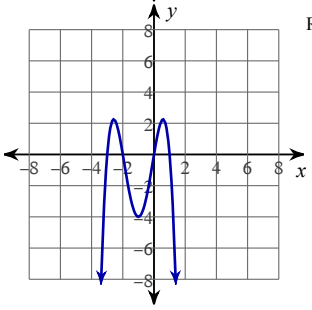
452)  Real zeros: {0 mult. 3, −2, −1}

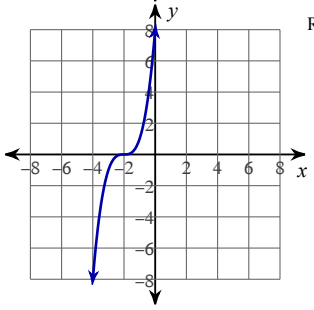
453)  Real zeros: {1 mult. 2, −1 mult. 2}

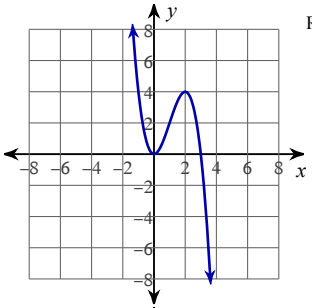
454)  Real zeros: {0 mult. 2, 1 mult. 2}

455)  Real zeros: {0, 1, −1 mult. 3}

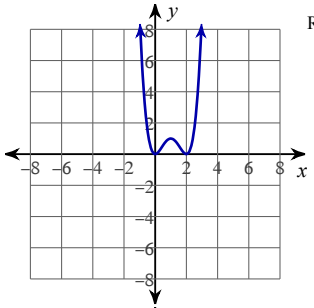
456)  Real zeros: {0, 1, −1}

457)  Real zeros: {0, 1, −3, −2}

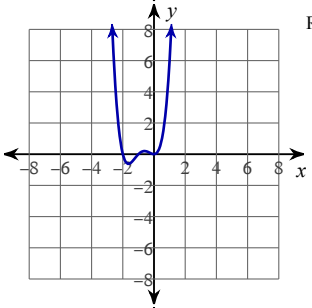
458)  Real zeros: {−2 mult. 3}

459) 

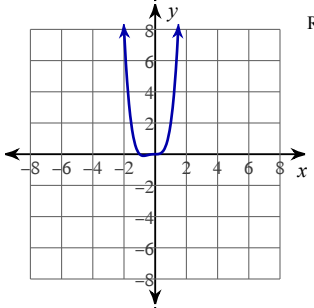
Real zeros: $\{0 \text{ mult. } 2, 3\}$

460) 

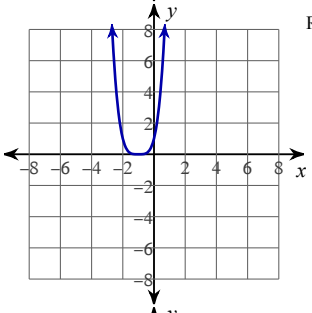
Real zeros: $\{0 \text{ mult. } 2, 2 \text{ mult. } 2\}$

461) 

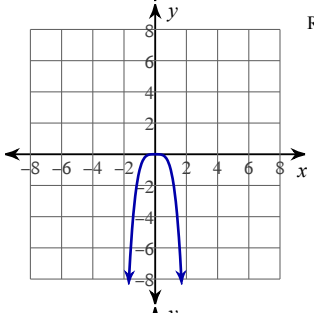
Real zeros: $\{0 \text{ mult. } 2, -2, -1\}$

462) 

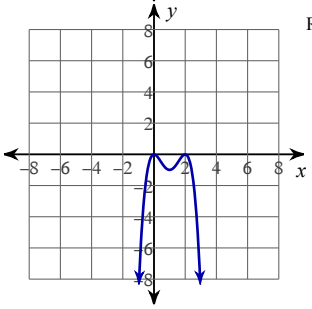
Real zeros: $\{0 \text{ mult. } 3, -1\}$

463) 

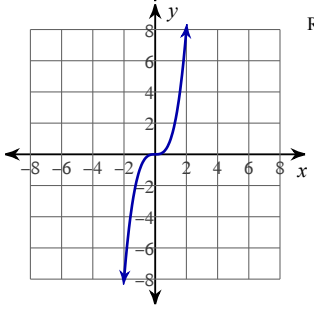
Real zeros: $\{-1 \text{ mult. } 4\}$

464) 

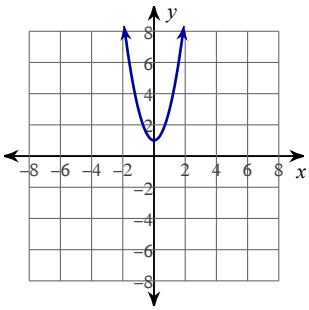
Real zeros: $\{0 \text{ mult. } 4\}$

465) 

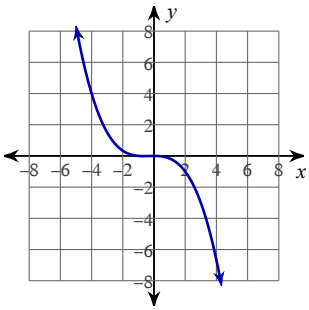
Real zeros: $\{0 \text{ mult. } 2, 2 \text{ mult. } 2\}$

466) 

Real zeros: $\{0 \text{ mult. } 3\}$

467) 

No x-intercepts. y-intercept at $y = 1$
Critical point at: $x = 0$
Increasing: $(0, \infty)$ Decreasing: $(-\infty, 0)$
No inflection points exist.
Concave up: $(-\infty, \infty)$ Concave down: No intervals exist.
Relative minimum: $(0, 1)$ No relative maxima.

468) 

x-intercepts at $x = -1, 0$ y-intercept at $y = 0$

Critical points at: $x = -\frac{2}{3}, 0$

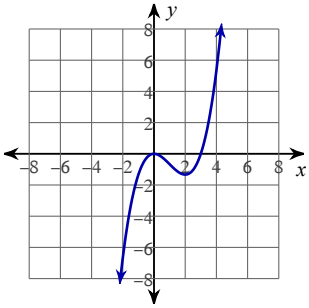
Increasing: $\left(-\frac{2}{3}, 0\right)$ Decreasing: $\left(-\infty, -\frac{2}{3}\right), (0, \infty)$

Inflection point at: $x = -\frac{1}{3}$

Concave up: $\left(-\infty, -\frac{1}{3}\right)$ Concave down: $\left(-\frac{1}{3}, \infty\right)$

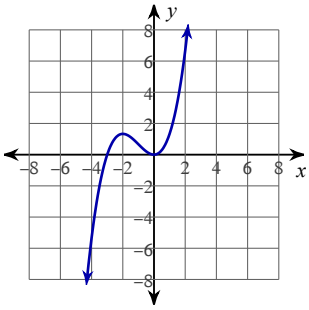
Relative minimum: $\left(-\frac{2}{3}, -\frac{1}{81}\right)$ Relative maximum: $(0, 0)$

469)



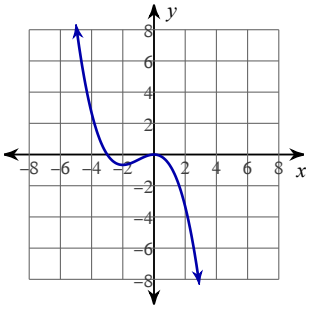
x-intercepts at $x = 0, 3$ y-intercept at $y = 0$
Critical points at: $x = 0, 2$
Increasing: $(-\infty, 0), (2, \infty)$ Decreasing: $(0, 2)$
Inflection point at: $x = 1$
Concave up: $(1, \infty)$ Concave down: $(-\infty, 1)$
Relative minimum: $\left(2, -\frac{4}{3}\right)$ Relative maximum: $(0, 0)$

470)



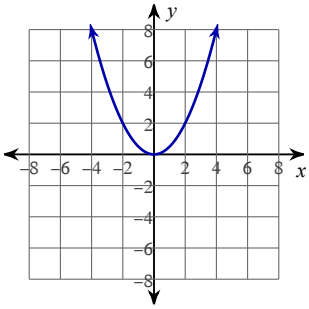
x-intercepts at $x = -3, 0$ y-intercept at $y = 0$
Critical points at: $x = -2, 0$
Increasing: $(-\infty, -2), (0, \infty)$ Decreasing: $(-2, 0)$
Inflection point at: $x = -1$
Concave up: $(-1, \infty)$ Concave down: $(-\infty, -1)$
Relative minimum: $(0, 0)$ Relative maximum: $\left(-2, \frac{4}{3}\right)$

471)



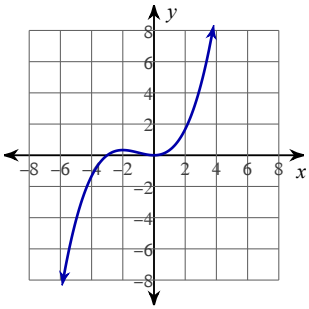
x-intercepts at $x = -3, 0$ y-intercept at $y = 0$
Critical points at: $x = -2, 0$
Increasing: $(-2, 0)$ Decreasing: $(-\infty, -2), (0, \infty)$
Inflection point at: $x = -1$
Concave up: $(-\infty, -1)$ Concave down: $(-1, \infty)$
Relative minimum: $\left(-2, -\frac{2}{3}\right)$ Relative maximum: $(0, 0)$

472)



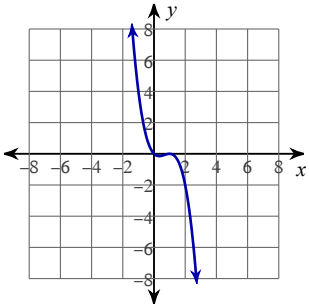
x-intercept at $x = 0$ y-intercept at $y = 0$
Critical point at: $x = 0$
Increasing: $(0, \infty)$ Decreasing: $(-\infty, 0)$
No inflection points exist.
Concave up: $(-\infty, \infty)$ Concave down: No intervals exist.
Relative minimum: $(0, 0)$ No relative maxima.

473)



x-intercepts at $x = -3, 0$ y-intercept at $y = 0$
Critical points at: $x = -2, 0$
Increasing: $(-\infty, -2), (0, \infty)$ Decreasing: $(-2, 0)$
Inflection point at: $x = -1$
Concave up: $(-1, \infty)$ Concave down: $(-\infty, -1)$
Relative minimum: $(0, 0)$ Relative maximum: $\left(-2, \frac{1}{3}\right)$

474)



x-intercepts at $x = 0, 1$ y-intercept at $y = 0$

Critical points at: $x = \frac{1}{3}, 1$

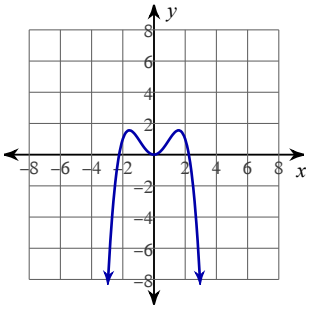
Increasing: $\left(\frac{1}{3}, 1\right)$ Decreasing: $\left(-\infty, \frac{1}{3}\right), (1, \infty)$

Inflection point at: $x = \frac{2}{3}$

Concave up: $\left(-\infty, \frac{2}{3}\right)$ Concave down: $\left(\frac{2}{3}, \infty\right)$

Relative minimum: $\left(\frac{1}{3}, -\frac{4}{27}\right)$ Relative maximum: $(1, 0)$

475)



x-intercepts at $x = -\sqrt{5}, 0, \sqrt{5}$ y-intercept at $y = 0$

Critical points at: $x = -\frac{\sqrt{10}}{2}, 0, \frac{\sqrt{10}}{2}$

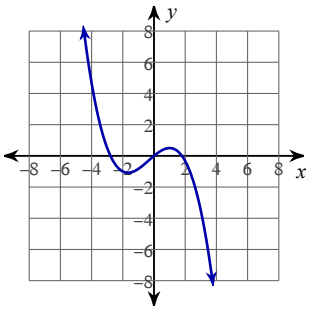
Increasing: $\left(-\infty, -\frac{\sqrt{10}}{2}\right), \left(0, \frac{\sqrt{10}}{2}\right)$ Decreasing: $\left(-\frac{\sqrt{10}}{2}, 0\right), \left(\frac{\sqrt{10}}{2}, \infty\right)$

Inflection points at: $x = -\frac{\sqrt{30}}{6}, \frac{\sqrt{30}}{6}$

Concave up: $\left(-\frac{\sqrt{30}}{6}, \frac{\sqrt{30}}{6}\right)$ Concave down: $\left(-\infty, -\frac{\sqrt{30}}{6}\right), \left(\frac{\sqrt{30}}{6}, \infty\right)$

Relative minimum: $(0, 0)$ Relative maxima: $\left(-\frac{\sqrt{10}}{2}, \frac{25}{16}\right), \left(\frac{\sqrt{10}}{2}, \frac{25}{16}\right)$

476)



x-intercepts at $x = \frac{-1 - \sqrt{21}}{2}, 0, \frac{-1 + \sqrt{21}}{2}$ y-intercept at $y = 0$

Critical points at: $x = -\frac{5}{3}, 1$

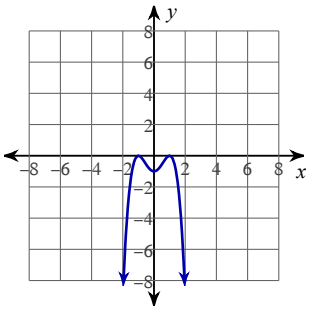
Increasing: $\left(-\frac{5}{3}, 1\right)$ Decreasing: $\left(-\infty, -\frac{5}{3}\right), (1, \infty)$

Inflection point at: $x = -\frac{1}{3}$

Concave up: $\left(-\infty, -\frac{1}{3}\right)$ Concave down: $\left(-\frac{1}{3}, \infty\right)$

Relative minimum: $\left(-\frac{5}{3}, -\frac{175}{162}\right)$ Relative maximum: $\left(1, \frac{1}{2}\right)$

477)



x-intercepts at $x = -1, 1$ y-intercept at $y = -1$

Critical points at: $x = -1, 0, 1$

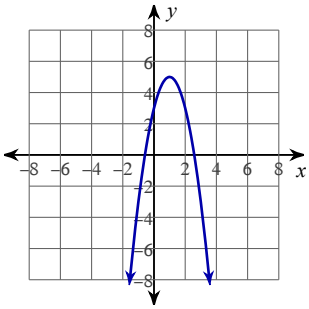
Increasing: $(-\infty, -1), (0, 1)$ Decreasing: $(-1, 0), (1, \infty)$

Inflection points at: $x = -\frac{\sqrt{3}}{3}, \frac{\sqrt{3}}{3}$

Concave up: $\left(-\frac{\sqrt{3}}{3}, \frac{\sqrt{3}}{3}\right)$ Concave down: $\left(-\infty, -\frac{\sqrt{3}}{3}\right), \left(\frac{\sqrt{3}}{3}, \infty\right)$

Relative minimum: $(0, -1)$ Relative maxima: $(-1, 0), (1, 0)$

478)



x-intercepts at $x = \frac{2 - \sqrt{10}}{2}, \frac{2 + \sqrt{10}}{2}$ y-intercept at $y = 3$

Critical point at: $x = 1$

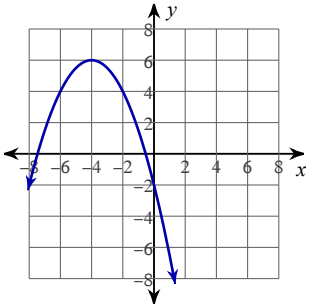
Increasing: $(-\infty, 1)$ Decreasing: $(1, \infty)$

No inflection points exist.

Concave up: No intervals exist. Concave down: $(-\infty, \infty)$

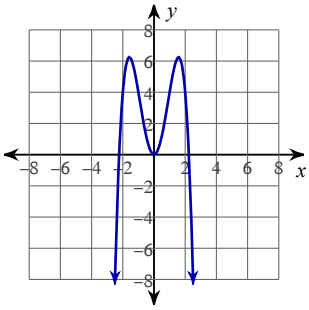
No relative minima. Relative maximum: $(1, 5)$

479)



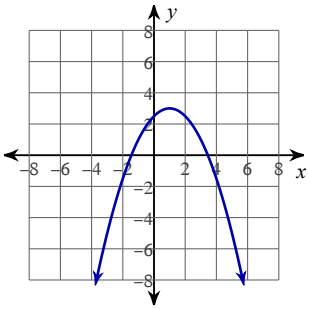
x-intercepts at $x = -4 - 2\sqrt{3}, -4 + 2\sqrt{3}$ y-intercept at $y = -2$
Critical point at: $x = -4$
Increasing: $(-\infty, -4)$ Decreasing: $(-4, \infty)$
No inflection points exist.
Concave up: No intervals exist. Concave down: $(-\infty, \infty)$
No relative minima. Relative maximum: $(-4, 6)$

480)



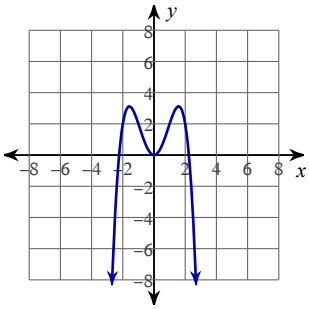
x-intercepts at $x = -\sqrt{5}, 0, \sqrt{5}$ y-intercept at $y = 0$
Critical points at: $x = -\frac{\sqrt{10}}{2}, 0, \frac{\sqrt{10}}{2}$
Increasing: $\left(-\infty, -\frac{\sqrt{10}}{2}\right), \left(0, \frac{\sqrt{10}}{2}\right)$ Decreasing: $\left(-\frac{\sqrt{10}}{2}, 0\right), \left(\frac{\sqrt{10}}{2}, \infty\right)$
Inflection points at: $x = -\frac{\sqrt{30}}{6}, \frac{\sqrt{30}}{6}$
Concave up: $\left(-\frac{\sqrt{30}}{6}, \frac{\sqrt{30}}{6}\right)$ Concave down: $\left(-\infty, -\frac{\sqrt{30}}{6}\right), \left(\frac{\sqrt{30}}{6}, \infty\right)$
Relative minimum: $(0, 0)$ Relative maxima: $\left(-\frac{\sqrt{10}}{2}, \frac{25}{4}\right), \left(\frac{\sqrt{10}}{2}, \frac{25}{4}\right)$

481)



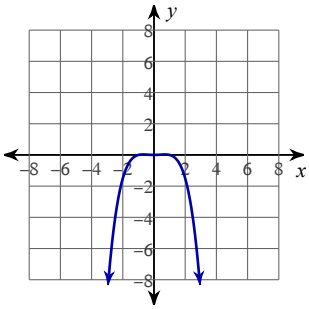
x-intercepts at $x = 1 - \sqrt{6}, 1 + \sqrt{6}$ y-intercept at $y = \frac{5}{2}$
Critical point at: $x = 1$
Increasing: $(-\infty, 1)$ Decreasing: $(1, \infty)$
No inflection points exist.
Concave up: No intervals exist. Concave down: $(-\infty, \infty)$
No relative minima. Relative maximum: $(1, 3)$

482)



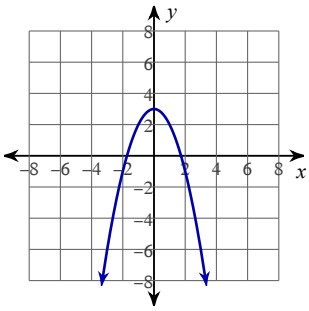
x-intercepts at $x = -\sqrt{5}, 0, \sqrt{5}$ y-intercept at $y = 0$
Critical points at: $x = -\frac{\sqrt{10}}{2}, 0, \frac{\sqrt{10}}{2}$
Increasing: $\left(-\infty, -\frac{\sqrt{10}}{2}\right), \left(0, \frac{\sqrt{10}}{2}\right)$ Decreasing: $\left(-\frac{\sqrt{10}}{2}, 0\right), \left(\frac{\sqrt{10}}{2}, \infty\right)$
Inflection points at: $x = -\frac{\sqrt{30}}{6}, \frac{\sqrt{30}}{6}$
Concave up: $\left(-\frac{\sqrt{30}}{6}, \frac{\sqrt{30}}{6}\right)$ Concave down: $\left(-\infty, -\frac{\sqrt{30}}{6}\right), \left(\frac{\sqrt{30}}{6}, \infty\right)$
Relative minimum: $(0, 0)$ Relative maxima: $\left(-\frac{\sqrt{10}}{2}, \frac{25}{8}\right), \left(\frac{\sqrt{10}}{2}, \frac{25}{8}\right)$

483)



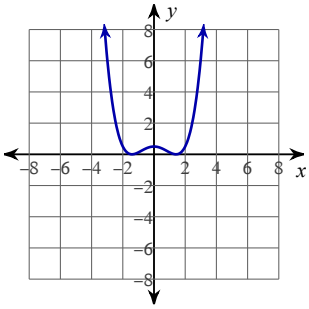
x-intercepts at $x = -1, 0, 1$ y-intercept at $y = 0$
Critical points at: $x = -\frac{\sqrt{2}}{2}, 0, \frac{\sqrt{2}}{2}$
Increasing: $\left(-\infty, -\frac{\sqrt{2}}{2}\right), \left(0, \frac{\sqrt{2}}{2}\right)$ Decreasing: $\left(-\frac{\sqrt{2}}{2}, 0\right), \left(\frac{\sqrt{2}}{2}, \infty\right)$
Inflection points at: $x = -\frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}$
Concave up: $\left(-\frac{\sqrt{6}}{6}, \frac{\sqrt{6}}{6}\right)$ Concave down: $\left(-\infty, -\frac{\sqrt{6}}{6}\right), \left(\frac{\sqrt{6}}{6}, \infty\right)$
Relative minimum: $(0, 0)$ Relative maxima: $\left(-\frac{\sqrt{2}}{2}, \frac{1}{32}\right), \left(\frac{\sqrt{2}}{2}, \frac{1}{32}\right)$

484)



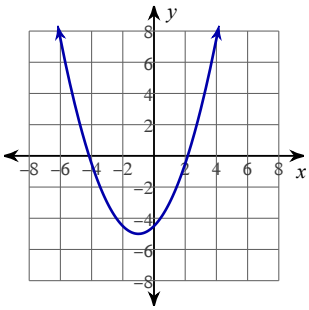
x-intercepts at $x = -\sqrt{3}, \sqrt{3}$ y-intercept at $y = 3$
Critical point at: $x = 0$
Increasing: $(-\infty, 0)$ Decreasing: $(0, \infty)$
No inflection points exist.
Concave up: No intervals exist. Concave down: $(-\infty, \infty)$
No relative minima. Relative maximum: $(0, 3)$

485)



x-intercepts at $x = -\sqrt{2}, \sqrt{2}$ y-intercept at $y = \frac{1}{2}$
Critical points at: $x = -\sqrt{2}, 0, \sqrt{2}$
Increasing: $(-\sqrt{2}, 0), (\sqrt{2}, \infty)$ Decreasing: $(-\infty, -\sqrt{2}), (0, \sqrt{2})$
Inflection points at: $x = -\frac{\sqrt{6}}{3}, \frac{\sqrt{6}}{3}$
Concave up: $\left(-\infty, -\frac{\sqrt{6}}{3}\right), \left(\frac{\sqrt{6}}{3}, \infty\right)$ Concave down: $\left(-\frac{\sqrt{6}}{3}, \frac{\sqrt{6}}{3}\right)$
Relative minima: $(-\sqrt{2}, 0), (\sqrt{2}, 0)$ Relative maximum: $\left(0, \frac{1}{2}\right)$

486)



x-intercepts at $x = -1 - \sqrt{10}, -1 + \sqrt{10}$ y-intercept at $y = -\frac{9}{2}$
Critical point at: $x = -1$
Increasing: $(-1, \infty)$ Decreasing: $(-\infty, -1)$
No inflection points exist.
Concave up: $(-\infty, \infty)$ Concave down: No intervals exist.
Relative minimum: $(-1, -5)$ No relative maxima.

487) $\frac{1}{a-1}$; $\{1, -5\}$

488) $\frac{9}{5a+6}$; $\left\{-\frac{6}{5}\right\}$

489) $\frac{5r+4}{2}$; $\{0\}$

490) $\frac{1}{10}$; $\{-6\}$

491) $\frac{5n+6}{3n}$; $\{0\}$

492) $\frac{5x+7}{6x}$; $\{0\}$

493) $\frac{3r-7}{7r}$; $\{0\}$

494) $x - 6$; $\{-8\}$

495) $\frac{7a+4}{8}$; $\{0\}$

496) $7b$; $\{4\}$

497) $\frac{1}{3k-8}$; $\left\{2, \frac{8}{3}\right\}$

498) $\frac{1}{7r+1}$; $\left\{-4, -\frac{1}{7}\right\}$

499) $\frac{10}{5p+9}$; $\left\{0, -\frac{9}{5}\right\}$

500) $\frac{2(v+2)}{7}$; No excluded values.

501) $\frac{5x+3}{5x^2}$; $\{0\}$

502) $\frac{5}{2(n+2)}$; $\{-2\}$

503) $5n$; $\{2\}$

504) $\frac{5m-9}{2}$; No excluded values.

505) $\frac{6a^2}{5a+4}$; $\left\{0, -\frac{4}{5}\right\}$

506) $\frac{7n}{5(n-1)}$; $\{1\}$

507) $\frac{1}{3}$; $\{8\}$

508) $\frac{10r}{5r-2}$; $\left\{\frac{2}{5}, -10\right\}$

509) $\frac{5k-6}{2k-1}$; $\left\{\frac{1}{2}\right\}$

510) $\frac{9p}{7p-10}$; $\left\{4, \frac{10}{7}\right\}$

511) $\frac{3r-4}{2(r-2)}$; $\{2\}$

512) $\frac{7n+3}{3}$; $\{10\}$

513) $\frac{5x+1}{2x-1}$; $\left\{2, \frac{1}{2}\right\}$

514) $\frac{m+2}{-m+5}$; $\{8, 5\}$

515) $\frac{5(k-2)}{8k^2}$; $\{0, 3\}$

516) $\frac{4n}{n+4}$; $\{-10, -4\}$

517) $\frac{6(n-5)}{2n+3}$; $\left\{0, 5, -\frac{3}{2}\right\}$

518) $\frac{7(b-1)}{7b-8}$; $\left\{1, \frac{8}{7}\right\}$

519) $\frac{2}{r(r-1)}$; $\{0, 1, -8\}$

520) $\frac{5b+6}{(5b-4)(b+2)}$; $\left\{0, \frac{4}{5}, -2\right\}$

521) $\frac{3b+4}{3(b-1)}$; $\{0, 1, -7\}$

522) $\frac{3n(n+1)}{3n+5}$; $\left\{4, -\frac{5}{3}\right\}$ 523) $\frac{3(7v-8)}{7(v-2)}$; $\{0, 5, 2\}$ 524) $\frac{x(7x+5)}{5(x+1)}$; $\{9, -1\}$

525) $\frac{5k+6}{5(k+2)}$; $\{9, -2\}$ 526) $\frac{2n+7}{2(3n-4)}$; $\left\{1, \frac{4}{3}\right\}$ 527) $\{-3+\sqrt{6}\}$ 528) $\{-6+2\sqrt{2}\}$

529) The function is not continuous on $[-2, 2]$ 530) $\{-1\}$

531) The function is not continuous on $[-1, 1]$ 532) $\{-5+2\sqrt{2}\}$ 533) $\{5-2\sqrt{2}\}$

534) $\{4-\sqrt{10}\}$ 535) The function is not continuous on $[-1, 1]$ 536) $\{-4+\sqrt{7}\}$

537) Relative minimum: $\left(-3, -\frac{3}{2}\right)$
Relative maximum: $\left(3, \frac{3}{2}\right)$

538) No relative minima.
Relative maximum: $(0, 3)$

539) No relative minima.
Relative maximum: $\left(0, -\frac{3}{4}\right)$

540) Relative minimum: $(0, -4)$
No relative maxima.

541) Relative minimum: $(4, -2)$
Relative maximum: $(-4, 2)$

542) Relative minimum: $(0, -5)$
No relative maxima.

543) Relative minimum: $\left(0, \frac{1}{8}\right)$
No relative maxima.

544) Relative minimum: $(4, 4)$
Relative maximum: $(0, 0)$

545) Relative minimum: $\left(0, \frac{3}{4}\right)$
No relative maxima.

546) Relative minimum: $(0, 0)$
Relative maximum: $\left(-4, -\frac{8}{3}\right)$

547) Increasing: No intervals exist. Decreasing: $(-\infty, -2), (-2, \infty)$

548) Increasing: $(0, 1), (1, 2)$ Decreasing: $(-\infty, 0), (2, \infty)$

549) Increasing: No intervals exist. Decreasing: $(-\infty, 2), (2, \infty)$

550) Increasing: No intervals exist. Decreasing: $(-\infty, -3), (-3, \infty)$

551) Increasing: $(-\infty, 3), (3, \infty)$ Decreasing: No intervals exist.

552) Increasing: No intervals exist. Decreasing: $(-\infty, -1), (-1, \infty)$

553) Increasing: $(-\infty, -1), (-1, \infty)$ Decreasing: No intervals exist.

554) Increasing: No intervals exist. Decreasing: $(-\infty, -1), (-1, \infty)$

555) Increasing: $(-\infty, 2), (2, \infty)$ Decreasing: No intervals exist.

556) Increasing: $(-\infty, -2), (0, \infty)$ Decreasing: $(-2, -1), (-1, 0)$

557) Increasing: $(-\infty, 0), (1, \infty)$ Decreasing: $(0, 1)$

558) Increasing: No intervals exist. Decreasing: $(-\infty, -1), (-1, 1), (1, \infty)$

559) Increasing: $(-\infty, -4), (-4, 0)$ Decreasing: $(0, 4), (4, \infty)$

560) Increasing: $(-\infty, -3), (-3, 3), (3, \infty)$ Decreasing: No intervals exist.

561) Increasing: $(-2\sqrt{3}, -2), (-2, 2), (2, 2\sqrt{3})$ Decreasing: $(-\infty, -2\sqrt{3}), (2\sqrt{3}, \infty)$

562) Increasing: $(-\infty, -3), (2, \infty)$ Decreasing: $(-3, 2)$

563) Increasing: $(-\infty, -\sqrt{3}), (\sqrt{3}, \infty)$ Decreasing: $(-\sqrt{3}, 0), (0, \sqrt{3})$

564) Increasing: $(-\infty, -4), (-4, 0)$ Decreasing: $(0, 4), (4, \infty)$

565) Increasing: $(1, 2)$ Decreasing: $(-\infty, 1), (2, \infty)$

566) Increasing: $(-\infty, -2\sqrt{3}), (2\sqrt{3}, \infty)$ Decreasing: $(-2\sqrt{3}, -2), (-2, 2), (2, 2\sqrt{3})$

567) Concave up: $(-\infty, -2)$ Concave down: $(-2, \infty)$

568) Concave up: $(-\infty, 3)$ Concave down: $(3, \infty)$

569) Concave up: $(1, \infty)$ Concave down: $(-\infty, 1)$

570) Concave up: $(-\infty, 1)$ Concave down: $(1, \infty)$

571) Concave up: $(-1, \infty)$ Concave down: $(-\infty, -1)$

572) Concave up: $(-\infty, -3), (0, 3)$ Concave down: $(-3, 0), (3, \infty)$

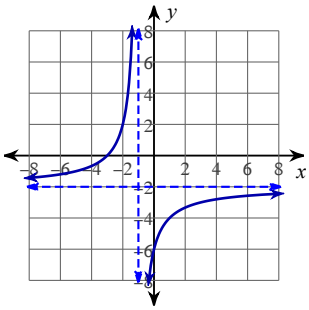
573) Concave up: $(-2, 0), (2, \infty)$ Concave down: $(-\infty, -2), (0, 2)$

574) Concave up: $(-3, 0), (3, \infty)$ Concave down: $(-\infty, -3), (0, 3)$

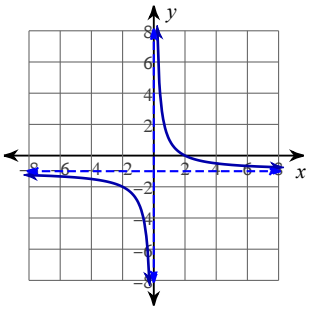
575) Concave up: $(-4\sqrt{3}, 0), (4\sqrt{3}, \infty)$ Concave down: $(-\infty, -4\sqrt{3}), (0, 4\sqrt{3})$

576) Concave up: $(-\sqrt{6}, 0), (\sqrt{6}, \infty)$ Concave down: $(-\infty, -\sqrt{6}), (0, \sqrt{6})$

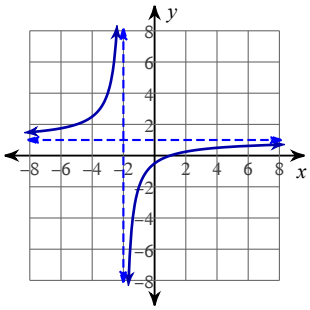
577)



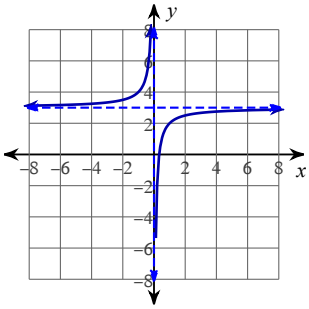
578)



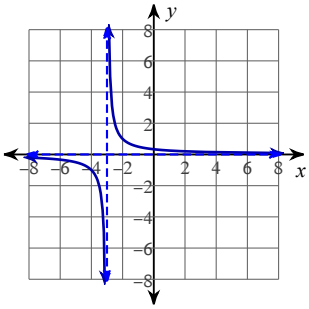
579)



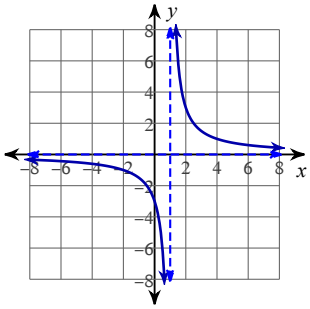
580)



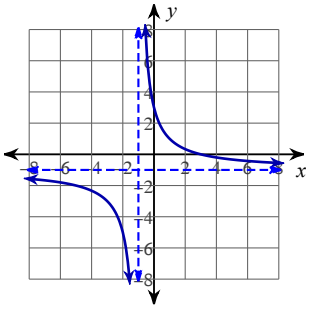
581)



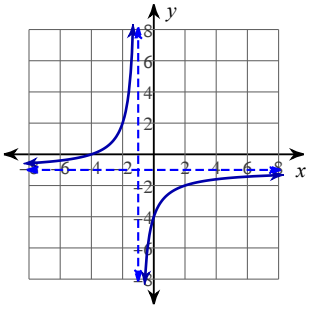
582)



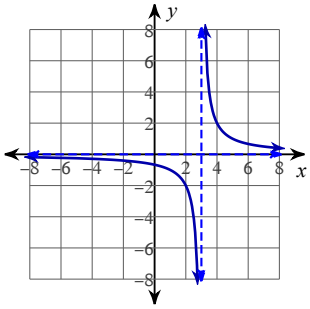
583)



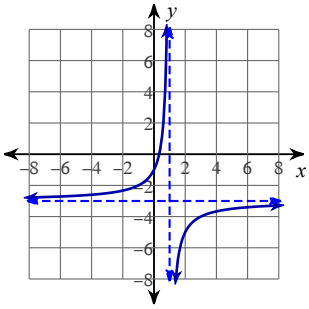
584)



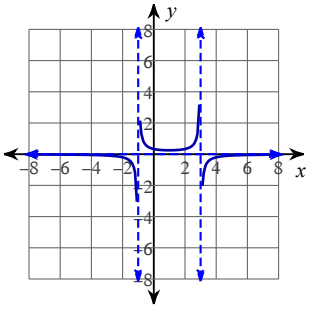
585)



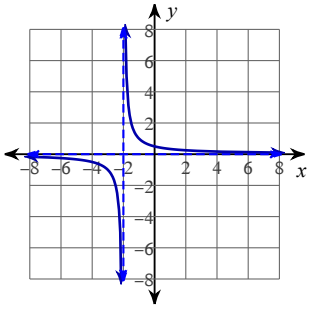
586)



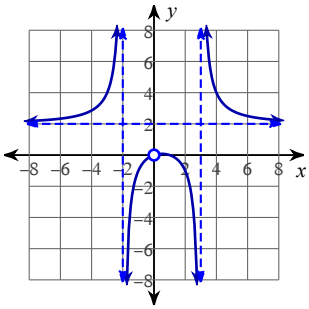
587)



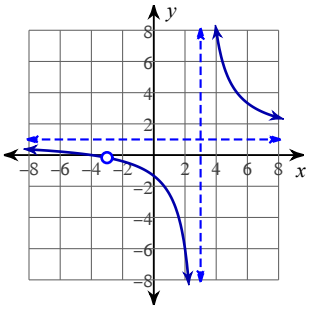
588)



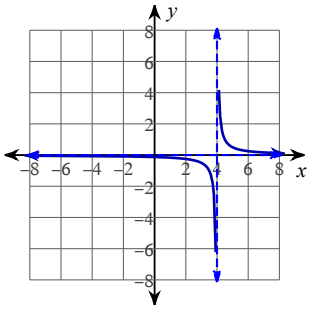
589)



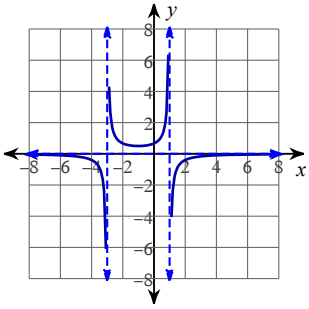
590)



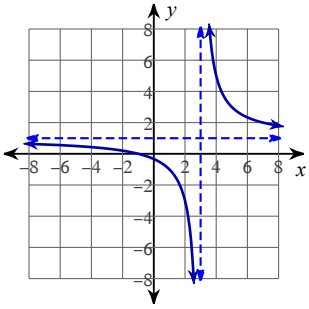
591)



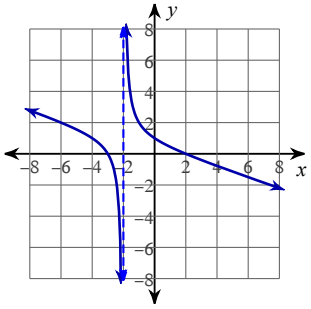
592)



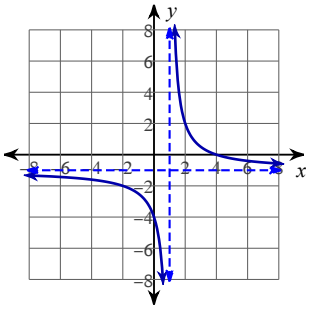
593)



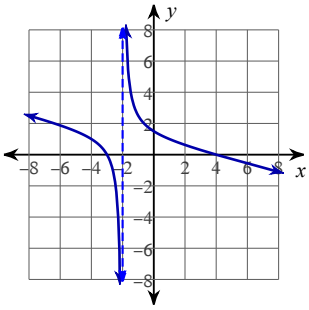
594)



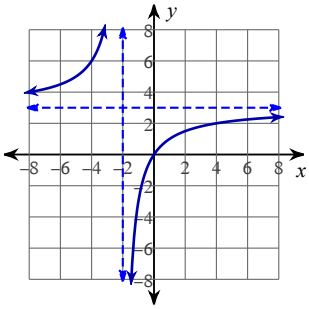
595)



596)

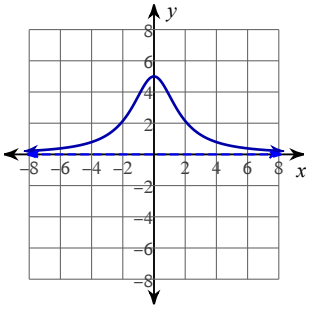


597)



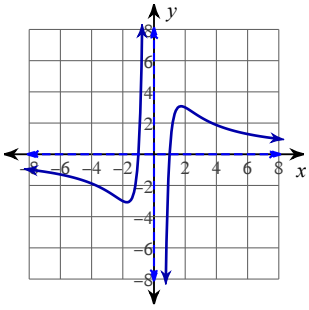
x-intercept at $x = 0$ y-intercept at $y = 0$
Vertical asymptote at: $x = -2$
Horizontal asymptote at: $y = 3$
No critical points exist.
Increasing: $(-\infty, -2), (-2, \infty)$ Decreasing: No intervals exist.
No inflection points exist.
Concave up: $(-\infty, -2)$ Concave down: $(-2, \infty)$
No relative minima. No relative maxima.

598)



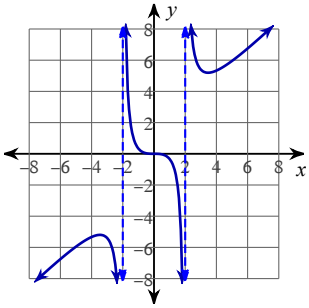
No x-intercepts. y-intercept at $y = 5$
No vertical asymptotes exist.
Horizontal asymptote at: $y = 0$
Critical point at: $x = 0$
Increasing: $(-\infty, 0)$ Decreasing: $(0, \infty)$
Inflection points at: $x = -1, 1$
Concave up: $(-\infty, -1), (1, \infty)$ Concave down: $(-1, 1)$
No relative minima. Relative maximum: $(0, 5)$

599)



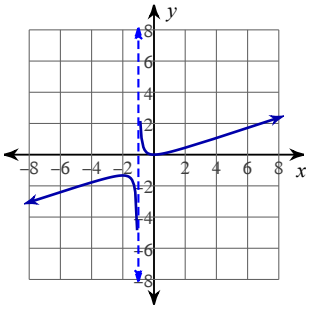
x-intercepts at $x = -1, 1$ No y-intercepts.
Vertical asymptote at: $x = 0$
Horizontal asymptote at: $y = 0$
Critical points at: $x = -\sqrt{3}, \sqrt{3}$
Increasing: $(-\sqrt{3}, 0), (0, \sqrt{3})$ Decreasing: $(-\infty, -\sqrt{3}), (\sqrt{3}, \infty)$
Inflection points at: $x = -\sqrt{6}, \sqrt{6}$
Concave up: $(-\sqrt{6}, 0), (\sqrt{6}, \infty)$ Concave down: $(-\infty, -\sqrt{6}), (0, \sqrt{6})$
Relative minimum: $\left(-\sqrt{3}, -\frac{16\sqrt{3}}{9}\right)$ Relative maximum: $\left(\sqrt{3}, \frac{16\sqrt{3}}{9}\right)$

600)



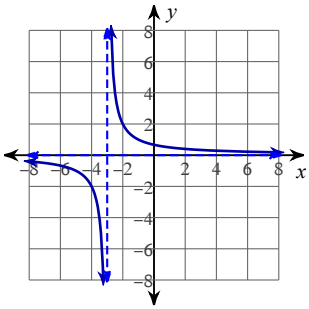
x-intercept at $x = 0$ y-intercept at $y = 0$
Vertical asymptotes at: $x = -2, 2$
No horizontal asymptotes exist.
Slant asymptote: $y = x$
Critical points at: $x = -2\sqrt{3}, 0, 2\sqrt{3}$
Increasing: $(-\infty, -2\sqrt{3}), (2\sqrt{3}, \infty)$ Decreasing: $(-2\sqrt{3}, -2), (-2, 2), (2, 2\sqrt{3})$
Inflection point at: $x = 0$
Concave up: $(-2, 0), (2, \infty)$ Concave down: $(-\infty, -2), (0, 2)$
Relative minimum: $(2\sqrt{3}, 3\sqrt{3})$ Relative maximum: $(-2\sqrt{3}, -3\sqrt{3})$

601)



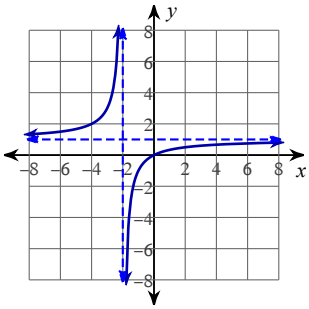
x-intercept at $x = 0$ y-intercept at $y = 0$
Vertical asymptote at: $x = -1$
No horizontal asymptotes exist.
Slant asymptote: $y = \frac{x}{3} - \frac{1}{3}$
Critical points at: $x = -2, 0$
Increasing: $(-\infty, -2), (0, \infty)$ Decreasing: $(-2, -1), (-1, 0)$
No inflection points exist.
Concave up: $(-1, \infty)$ Concave down: $(-\infty, -1)$
Relative minimum: $(0, 0)$ Relative maximum: $\left(-2, -\frac{4}{3}\right)$

602)



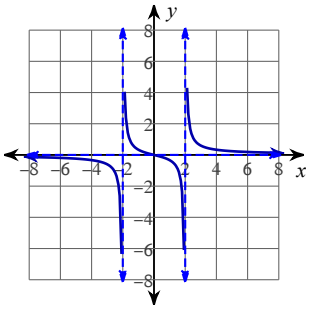
No x-intercepts. y-intercept at $y = \frac{2}{3}$
Vertical asymptote at: $x = -3$
Horizontal asymptote at: y = 0
No critical points exist.
Increasing: No intervals exist. Decreasing: $(-\infty, -3), (-3, \infty)$
No inflection points exist.
Concave up: $(-3, \infty)$ Concave down: $(-\infty, -3)$
No relative minima. No relative maxima.

603)



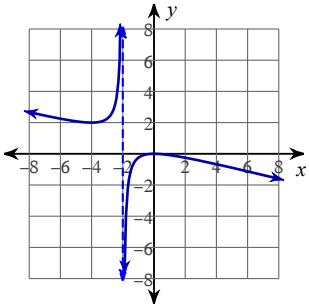
x-intercept at $x = 0$ y-intercept at $y = 0$
Vertical asymptote at: $x = -2$
Horizontal asymptote at: y = 1
No critical points exist.
Increasing: $(-\infty, -2), (-2, \infty)$ Decreasing: No intervals exist.
No inflection points exist.
Concave up: $(-\infty, -2)$ Concave down: $(-2, \infty)$
No relative minima. No relative maxima.

604)



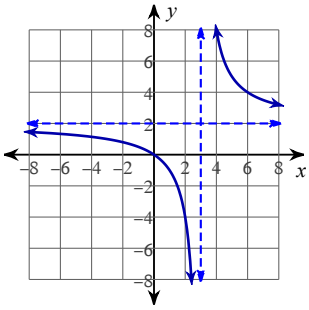
x-intercept at $x = 0$ y-intercept at $y = 0$
Vertical asymptotes at: $x = -2, 2$
Horizontal asymptote at: y = 0
No critical points exist.
Increasing: No intervals exist. Decreasing: $(-\infty, -2), (-2, 2), (2, \infty)$
Inflection point at: $x = 0$
Concave up: $(-2, 0), (2, \infty)$ Concave down: $(-\infty, -2), (0, 2)$
No relative minima. No relative maxima.

605)



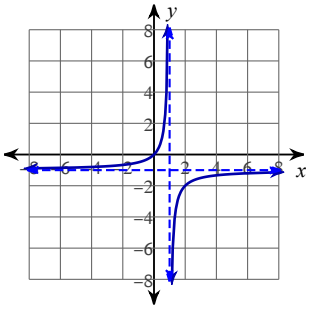
x-intercept at $x = 0$ y-intercept at $y = 0$
Vertical asymptote at: $x = -2$
No horizontal asymptotes exist.
Slant asymptote: $y = -\frac{x}{4} + \frac{1}{2}$
Critical points at: $x = -4, 0$
Increasing: $(-4, -2), (-2, 0)$ Decreasing: $(-\infty, -4), (0, \infty)$
No inflection points exist.
Concave up: $(-\infty, -2)$ Concave down: $(-2, \infty)$
Relative minimum: $(-4, 2)$ Relative maximum: $(0, 0)$

606)



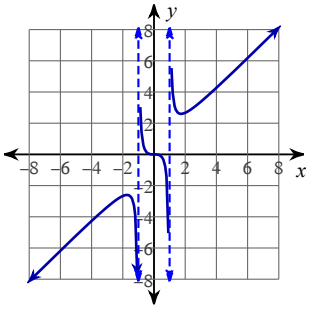
x-intercept at $x = 0$ y-intercept at $y = 0$
Vertical asymptote at: $x = 3$
Horizontal asymptote at: y = 2
No critical points exist.
Increasing: No intervals exist. Decreasing: $(-\infty, 3), (3, \infty)$
No inflection points exist.
Concave up: $(3, \infty)$ Concave down: $(-\infty, 3)$
No relative minima. No relative maxima.

607)



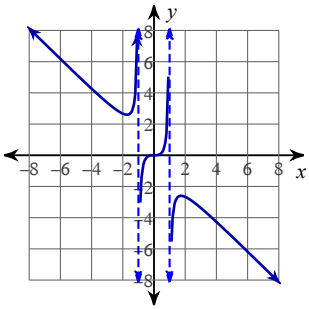
x-intercept at $x = 0$ y-intercept at $y = 0$
Vertical asymptote at: $x = 1$
Horizontal asymptote at: y = −1
No critical points exist.
Increasing: $(-\infty, 1), (1, \infty)$ Decreasing: No intervals exist.
No inflection points exist.
Concave up: $(-\infty, 1)$ Concave down: $(1, \infty)$
No relative minima. No relative maxima.

608)



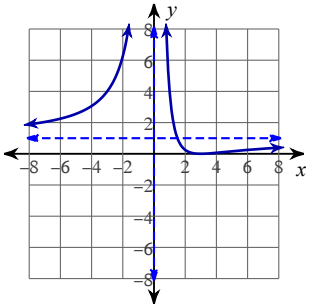
x-intercept at $x = 0$ y-intercept at $y = 0$
Vertical asymptotes at: $x = -1, 1$
No horizontal asymptotes exist.
Slant asymptote: $y = x$
Critical points at: $x = -\sqrt{3}, 0, \sqrt{3}$
Increasing: $(-\infty, -\sqrt{3}), (\sqrt{3}, \infty)$ Decreasing: $(-\sqrt{3}, -1), (-1, 1), (1, \sqrt{3})$
Inflection point at: $x = 0$
Concave up: $(-1, 0), (1, \infty)$ Concave down: $(-\infty, -1), (0, 1)$
Relative minimum: $\left(\sqrt{3}, \frac{3\sqrt{3}}{2}\right)$ Relative maximum: $\left(-\sqrt{3}, -\frac{3\sqrt{3}}{2}\right)$

609)



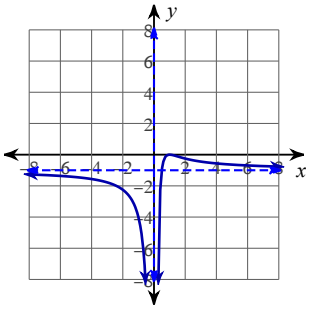
x-intercept at $x = 0$ y-intercept at $y = 0$
Vertical asymptotes at: $x = -1, 1$
No horizontal asymptotes exist.
Slant asymptote: $y = -x$
Critical points at: $x = -\sqrt{3}, 0, \sqrt{3}$
Increasing: $(-\sqrt{3}, -1), (-1, 1), (1, \sqrt{3})$ Decreasing: $(-\infty, -\sqrt{3}), (\sqrt{3}, \infty)$
Inflection point at: $x = 0$
Concave up: $(-\infty, -1), (0, 1)$ Concave down: $(-1, 0), (1, \infty)$
Relative minimum: $\left(-\sqrt{3}, \frac{3\sqrt{3}}{2}\right)$ Relative maximum: $\left(\sqrt{3}, -\frac{3\sqrt{3}}{2}\right)$

610)



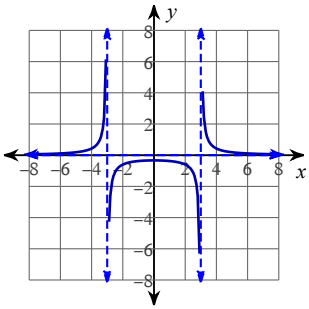
x-intercept at $x = 3$ No y-intercepts.
Vertical asymptote at: $x = 0$
Horizontal asymptote at: $y = 1$
Critical point at: $x = 3$
Increasing: $(-\infty, 0), (3, \infty)$ Decreasing: $(0, 3)$
Inflection point at: $x = \frac{9}{2}$
Concave up: $(-\infty, 0), \left(0, \frac{9}{2}\right)$ Concave down: $\left(\frac{9}{2}, \infty\right)$
Relative minimum: $(3, 0)$ No relative maxima.

611)



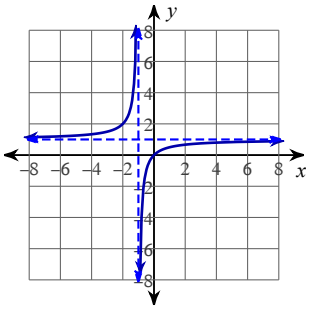
x-intercept at $x = 1$ No y-intercepts.
Vertical asymptote at: $x = 0$
Horizontal asymptote at: $y = -1$
Critical point at: $x = 1$
Increasing: $(0, 1)$ Decreasing: $(-\infty, 0), (1, \infty)$
Inflection point at: $x = \frac{3}{2}$
Concave up: $\left(\frac{3}{2}, \infty\right)$ Concave down: $(-\infty, 0), \left(0, \frac{3}{2}\right)$
No relative minima. Relative maximum: $(1, 0)$

612)



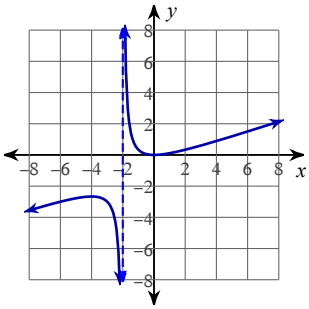
No x-intercepts. y-intercept at $y = -\frac{1}{3}$
Vertical asymptotes at: $x = -3, 3$
Horizontal asymptote at: $y = 0$
Critical point at: $x = 0$
Increasing: $(-\infty, -3), (-3, 0)$ Decreasing: $(0, 3), (3, \infty)$
No inflection points exist.
Concave up: $(-\infty, -3), (3, \infty)$ Concave down: $(-3, 3)$
No relative minima. Relative maximum: $\left(0, -\frac{1}{3}\right)$

613)



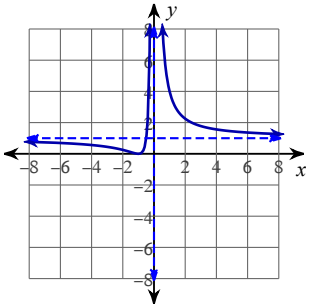
x-intercept at $x = 0$ y-intercept at $y = 0$
Vertical asymptote at: $x = -1$
Horizontal asymptote at: $y = 1$
No critical points exist.
Increasing: $(-\infty, -1), (-1, \infty)$ Decreasing: No intervals exist.
No inflection points exist.
Concave up: $(-\infty, -1)$ Concave down: $(-1, \infty)$
No relative minima. No relative maxima.

614)



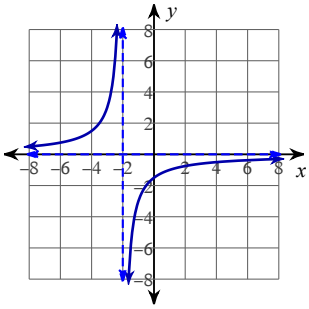
x-intercept at $x = 0$ y-intercept at $y = 0$
Vertical asymptote at: $x = -2$
No horizontal asymptotes exist.
Slant asymptote: $y = \frac{x}{3} - \frac{2}{3}$
Critical points at: $x = -4, 0$
Increasing: $(-\infty, -4), (0, \infty)$ Decreasing: $(-4, -2), (-2, 0)$
No inflection points exist.
Concave up: $(-2, \infty)$ Concave down: $(-\infty, -2)$
Relative minimum: $(0, 0)$ Relative maximum: $\left(-4, -\frac{8}{3}\right)$

615)



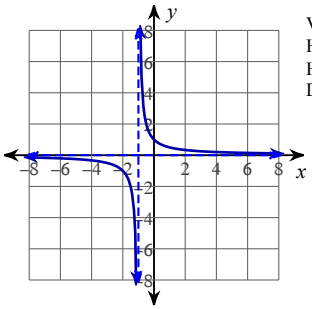
x-intercept at $x = -1$ No y-intercepts.
Vertical asymptote at: $x = 0$
Horizontal asymptote at: y = 1
Critical point at: $x = -1$
Increasing: $(-1, 0)$ Decreasing: $(-\infty, -1), (0, \infty)$
Inflection point at: $x = -\frac{3}{2}$
Concave up: $\left(-\frac{3}{2}, 0\right), (0, \infty)$ Concave down: $\left(-\infty, -\frac{3}{2}\right)$
Relative minimum: $(-1, 0)$ No relative maxima.

616)



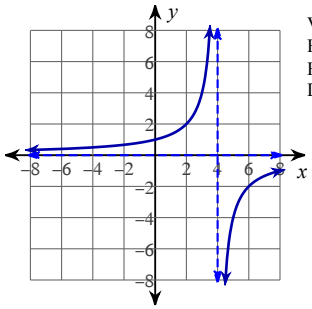
No x-intercepts. y-intercept at $y = -\frac{3}{2}$
Vertical asymptote at: $x = -2$
Horizontal asymptote at: y = 0
No critical points exist.
Increasing: $(-\infty, -2), (-2, \infty)$ Decreasing: No intervals exist.
No inflection points exist.
Concave up: $(-\infty, -2)$ Concave down: $(-2, \infty)$
No relative minima. No relative maxima.

617)



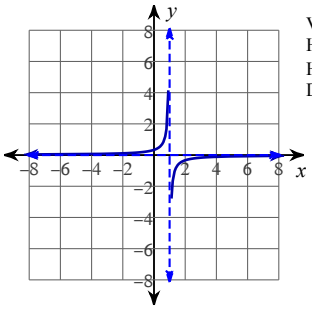
Vertical Asym.: $x = -1$
Holes: None
Horz. Asym.: $y = 0$
Domain:
All reals except -1

618)



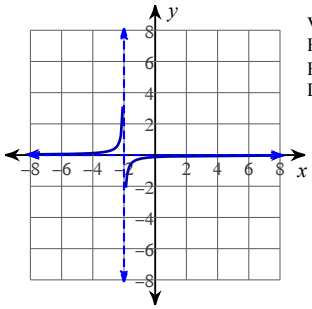
Vertical Asym.: $x = 4$
Holes: None
Horz. Asym.: $y = 0$
Domain:
All reals except 4

619)



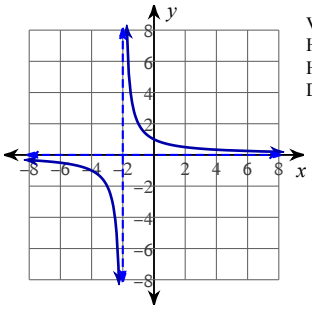
Vertical Asym.: $x = 1$
Holes: None
Horz. Asym.: $y = 0$
Domain:
All reals except 1

620)



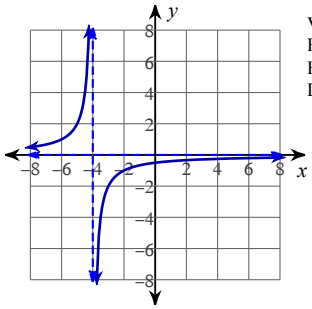
Vertical Asym.: $x = -2$
Holes: None
Horz. Asym.: $y = 0$
Domain:
All reals except -2

621)



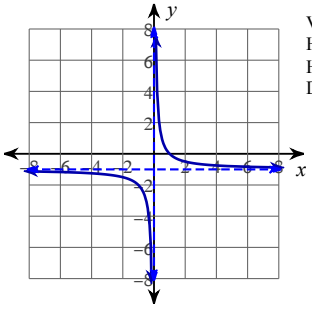
Vertical Asym.: $x = -2$
Holes: None
Horz. Asym.: $y = 0$
Domain:
All reals except -2

622)



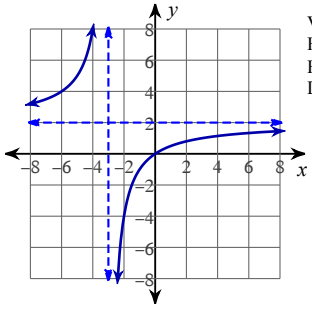
Vertical Asym.: $x = -4$
Holes: None
Horz. Asym.: $y = 0$
Domain:
All reals except -4

623)



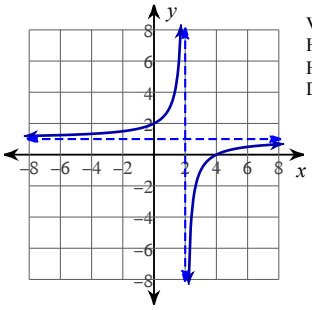
Vertical Asym.: $x = 0$
Holes: None
Horz. Asym.: $y = -1$
Domain:
All reals except 0

624)



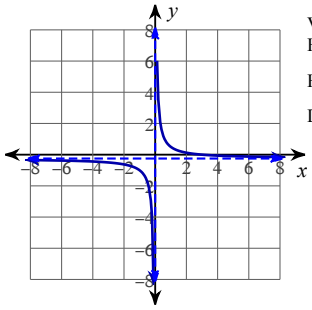
Vertical Asym.: $x = -3$
Holes: None
Horz. Asym.: $y = 2$
Domain:
All reals except -3

625)



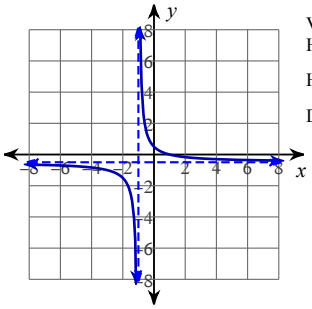
Vertical Asym.: $x = 2$
Holes: None
Horz. Asym.: $y = 1$
Domain:
All reals except 2

626)



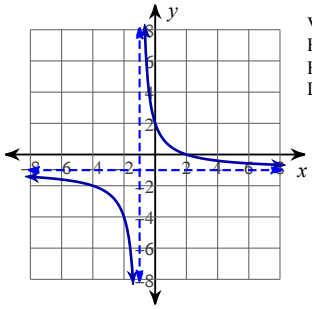
Vertical Asym.: $x = 0$
Holes: None
Horz. Asym.: $y = -\frac{1}{4}$
Domain:
All reals except 0

627)



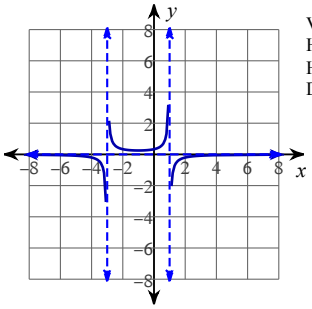
Vertical Asym.: $x = -1$
Holes: None
Horz. Asym.: $y = -\frac{1}{2}$
Domain:
All reals except -1

628)



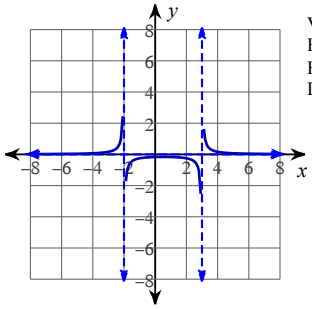
Vertical Asym.: $x = -1$
Holes: None
Horz. Asym.: $y = -1$
Domain:
All reals except -1

629)



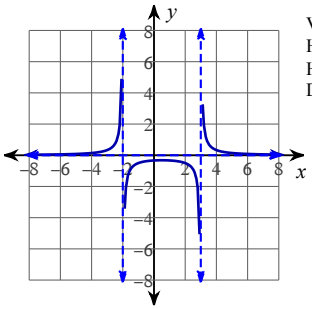
Vertical Asym.: $x = 1, x = -3$
Holes: None
Horz. Asym.: $y = 0$
Domain:
All reals except $-3, 1$

630)



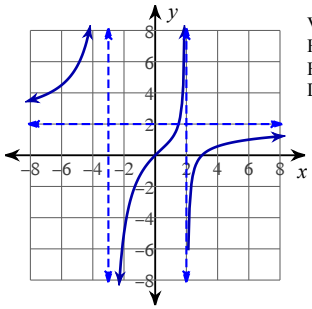
Vertical Asym.: $x = 3, x = -2$
Holes: None
Horz. Asym.: $y = 0$
Domain:
All reals except $-2, 3$

631)



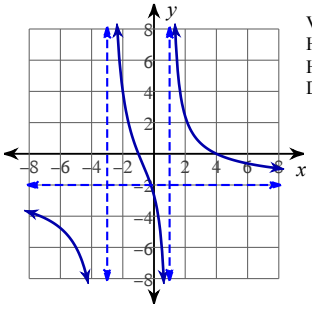
Vertical Asym.: $x = 3, x = -2$
Holes: None
Horz. Asym.: $y = 0$
Domain:
All reals except $-2, 3$

632)



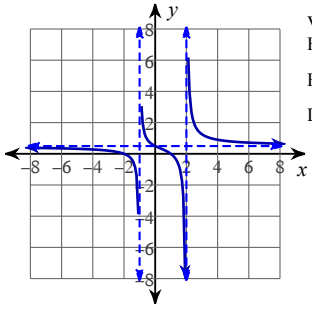
Vertical Asym.: $x = 2, x = -3$
Holes: None
Horz. Asym.: $y = 2$
Domain:
All reals except $-3, 2$

633)



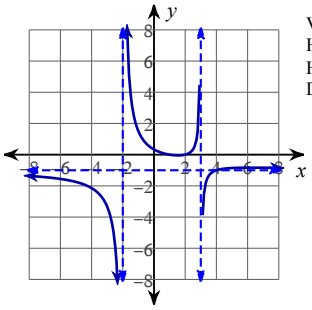
Vertical Asym.: $x = 1$, $x = -3$
Holes: None
Horz. Asym.: $y = -2$
Domain:
All reals except -3, 1

634)



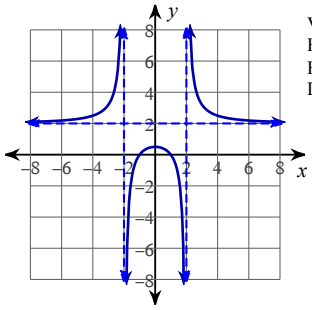
Vertical Asym.: $x = 2$, $x = -1$
Holes: None
Horz. Asym.: $y = \frac{1}{2}$
Domain:
All reals except -1, 2

635)



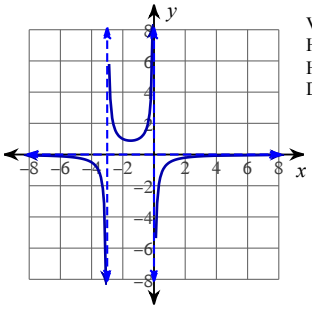
Vertical Asym.: $x = 3$, $x = -2$
Holes: None
Horz. Asym.: $y = -1$
Domain:
All reals except -2, 3

636)



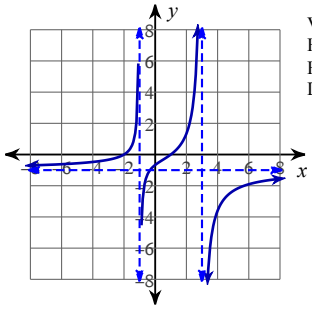
Vertical Asym.: $x = 2$, $x = -2$
Holes: None
Horz. Asym.: $y = 2$
Domain:
All reals except -2, 2

637)



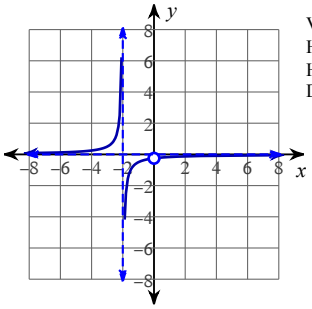
Vertical Asym.: $x = 0$, $x = -3$
Holes: None
Horz. Asym.: $y = 0$
Domain:
All reals except -3, 0

638)



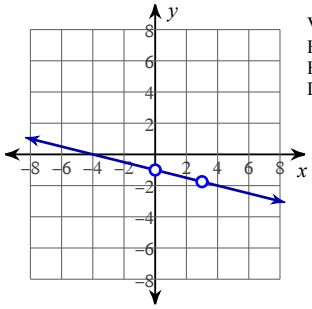
Vertical Asym.: $x = 3$, $x = -1$
Holes: None
Horz. Asym.: $y = -1$
Domain:
All reals except -1, 3

639)



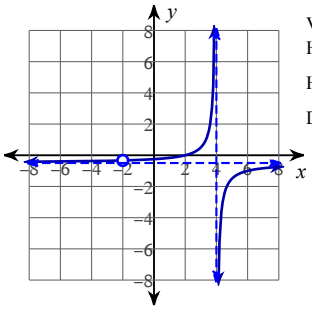
Vertical Asym.: $x = -2$
Holes: $x = 0$
Horz. Asym.: $y = 0$
Domain:
All reals except -2, 0

640)



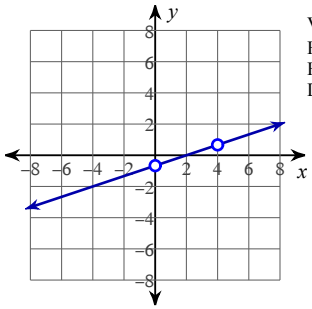
Vertical Asym.: None
Holes: $x = 0$, $x = 3$
Horz. Asym.: None
Domain:
All reals except 0, 3

641)



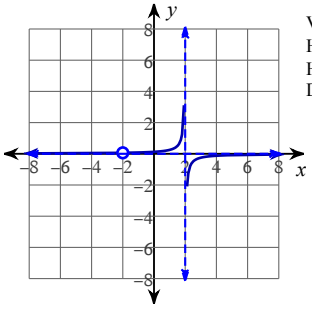
Vertical Asym.: $x = 4$
Holes: $x = -2$
Horz. Asym.: $y = -\frac{1}{2}$
Domain:
All reals except -2, 4

642)



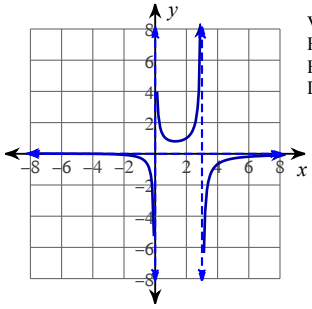
Vertical Asym.: None
Holes: $x = 0$, $x = 4$
Horz. Asym.: None
Domain:
All reals except 0, 4

643)



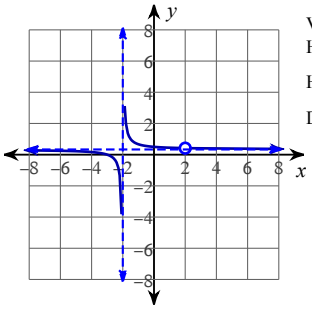
Vertical Asym.: $x = 2$
Holes: $x = -2$
Horz. Asym.: $y = 0$
Domain:
All reals except -2, 2

644)



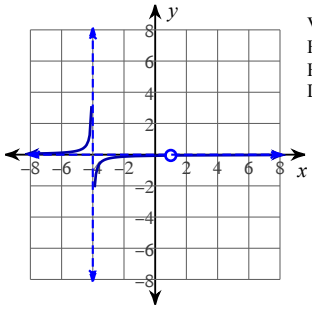
Vertical Asym.: $x = 0$, $x = 3$
Holes: None
Horz. Asym.: $y = 0$
Domain:
All reals except 0, 3

645)



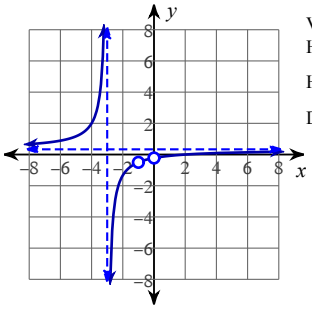
Vertical Asym.: $x = -2$
Holes: $x = 2$
Horz. Asym.: $y = \frac{1}{3}$
Domain:
All reals except -2, 2

646)



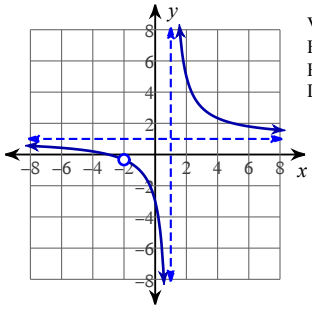
Vertical Asym.: $x = -4$
Holes: $x = 1$
Horz. Asym.: $y = 0$
Domain:
All reals except -4, 1

647)



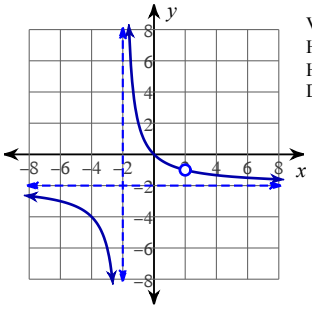
Vertical Asym.: $x = -3$
Holes: $x = -1$, $x = 0$
Horz. Asym.: $y = \frac{1}{3}$
Domain:
All reals except -3, -1, 0

648)



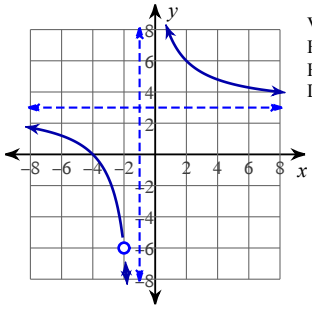
Vertical Asym.: $x = 1$
Holes: $x = -2$
Horz. Asym.: $y = 1$
Domain:
All reals except -2, 1

649)



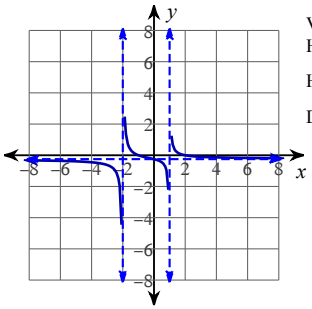
Vertical Asym.: $x = -2$
Holes: $x = 2$
Horz. Asym.: $y = -2$
Domain:
All reals except -2, 2

650)



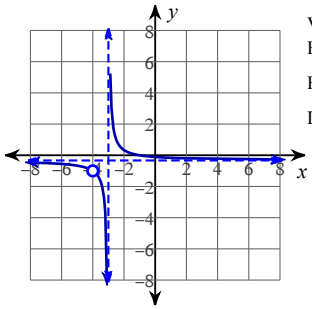
Vertical Asym.: $x = -1$
Holes: $x = -2$
Horz. Asym.: $y = 3$
Domain:
All reals except -2, -1

651)



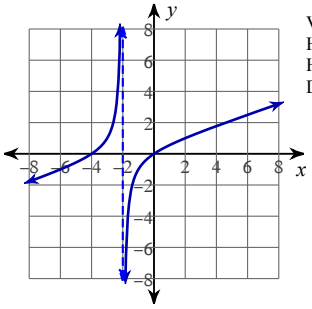
Vertical Asym.: $x = 1$, $x = -2$
Holes: None
Horz. Asym.: $y = -\frac{1}{4}$
Domain:
All reals except -2, 1

652)



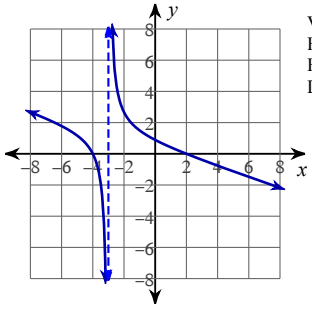
Vertical Asym.: $x = -3$
Holes: $x = -4$
Horz. Asym.: $y = -\frac{1}{3}$
Domain:
All reals except -4, -3

653)



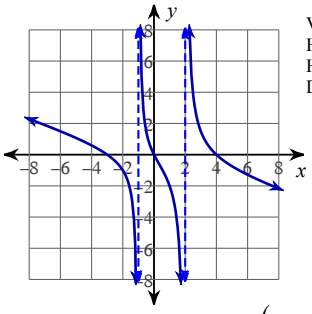
Vertical Asym.: $x = -2$
Holes: None
Horz. Asym.: None
Domain:
All reals except -2

654)



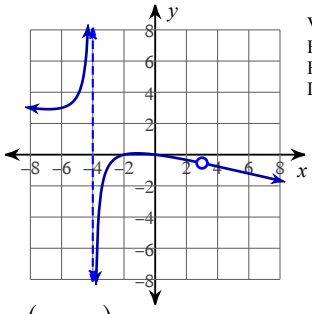
Vertical Asym.: $x = -3$
Holes: None
Horz. Asym.: None
Domain:
All reals except -3

655)



Vertical Asym.: $x = 2$, $x = -1$
Holes: None
Horz. Asym.: None
Domain:
All reals except -1, 2

656)



Vertical Asym.: $x = -4$
Holes: $x = 3$
Horz. Asym.: None
Domain:
All reals except -4, 3

657) Relative minimum: $(5, 0)$
No relative maxima.

658) Relative minimum: $(-1, 0)$
No relative maxima.

659) No relative minima.
Relative maximum: $(-3, 0)$

660) Relative minimum: $(4, 0)$
No relative maxima.

661) Relative minimum: $(-2, 0)$
No relative maxima.

662) No relative minima.
Relative maximum: $(-6, 0)$

663) Relative minimum: $(-3, 0)$
No relative maxima.

664) Relative minimum: $(4, 0)$
No relative maxima.

665) No relative minima.
Relative maximum: $(4, 0)$

666) Relative minimum: $(5, 0)$
No relative maxima.

667) Relative minimum: $\left(0, \dfrac{-10 - 12\sqrt[3]{2}}{5}\right)$
Relative maximum: $(4, -2)$

668) Relative minimum: $(0, -2)$
Relative maxima: $(-2, 3\sqrt[3]{4} - 2)$, $(2, 3\sqrt[3]{4} - 2)$

669) Relative minima: $(-1, -3\sqrt[3]{4} + 1)$, $(3, -3\sqrt[3]{4} + 1)$
Relative maximum: $(1, 1)$

670) Relative minimum: $(4, 0)$
Relative maximum: $\left(0, \dfrac{12\sqrt[3]{2}}{5}\right)$

671) Relative minimum: $(1, 1 - 4\sqrt[3]{2})$
Relative maximum: $(-3, 1 + 4\sqrt[3]{2})$

672) Relative minimum: $(3, -1)$
Relative maxima: $(1, 3\sqrt[3]{4} - 1)$, $(5, 3\sqrt[3]{4} - 1)$

673) Relative minimum: $(1, 2)$
Relative maxima: $(-1, 3\sqrt[3]{4} + 2)$, $(3, 3\sqrt[3]{4} + 2)$

674) Relative minima: $(0, -3\sqrt[3]{4} + 1)$, $(4, -3\sqrt[3]{4} + 1)$
Relative maximum: $(2, 1)$

675) Relative minimum: $(4, 2)$
Relative maximum: $\left(0, \dfrac{10 + 12\sqrt[3]{2}}{5}\right)$

676) Relative minimum: $(-3, -4\sqrt[3]{2})$
Relative maximum: $(1, 4\sqrt[3]{2})$

677) Increasing: $(-2, \infty)$ Decreasing: No intervals exist.

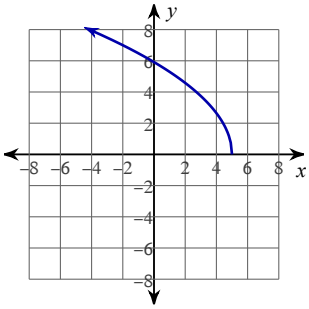
678) Increasing: $(-\infty, \infty)$ Decreasing: No intervals exist.

679) Increasing: $(-6, \infty)$ Decreasing: $(-\infty, -6)$

680) Increasing: $(2, \infty)$ Decreasing: $(-\infty, 2)$

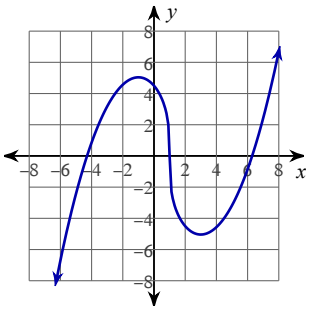
681) Increasing: $(-\infty, 5)$ Decreasing: $(5, \infty)$

682) Increasing: No intervals exist. Decreasing: $(-\infty, \infty)$
683) Increasing: No intervals exist. Decreasing: $(-\infty, 2)$
684) Increasing: $(-3, \infty)$ Decreasing: No intervals exist.
685) Increasing: No intervals exist. Decreasing: $(-\infty, \infty)$
686) Increasing: $(-\infty, \infty)$ Decreasing: No intervals exist.
687) Increasing: $(-\infty, -2), (2, \infty)$ Decreasing: $(-2, 2)$
688) Increasing: $(-\infty, -5), (-3, -1)$ Decreasing: $(-5, -3), (-1, \infty)$
689) Increasing: $(1, 3), (5, \infty)$ Decreasing: $(-\infty, 1), (3, 5)$
690) Increasing: $(0, \infty)$ Decreasing: $(-\infty, 0)$
691) Increasing: $(-\infty, 0), (2, 4)$ Decreasing: $(0, 2), (4, \infty)$
692) Increasing: $(-\infty, 1)$ Decreasing: $(1, \infty)$
693) Increasing: $(-1, 3)$ Decreasing: $(-\infty, -1), (3, \infty)$
694) Increasing: $(-3, 1)$ Decreasing: $(-\infty, -3), (1, \infty)$
695) Increasing: $(-\infty, 0), (4, \infty)$ Decreasing: $(0, 4)$
696) Increasing: $(-\infty, -3), (1, \infty)$ Decreasing: $(-3, 1)$
697) Concave up: $(-\infty, -4)$ Concave down: $(-4, \infty)$
698) Concave up: $(-\infty, -5)$ Concave down: $(-5, \infty)$
699) Concave up: $(-6, \infty)$ Concave down: $(-\infty, -6)$
700) Concave up: $(-\infty, 3)$ Concave down: $(3, \infty)$
701) Concave up: No intervals exist. Concave down: $(-\infty, -3), (-3, \infty)$
702) Concave up: $(5, \infty)$ Concave down: $(-\infty, 3), (3, 5)$
703) Concave up: No intervals exist. Concave down: $(-\infty, 2), (2, \infty)$
704) Concave up: $(0, \infty)$ Concave down: $(-\infty, 0)$
705) Concave up: $(2, \infty)$ Concave down: $(-\infty, 2)$
706) Concave up: $(1, \infty)$ Concave down: $(-\infty, 1)$
707)



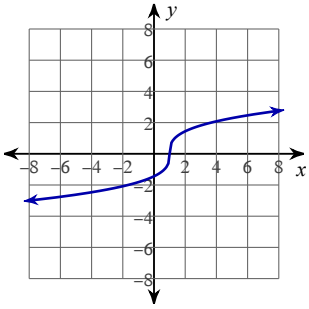
x-intercept at $x = 5$ y-intercept at $y = \sqrt{35}$
No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical point at: $x = 5$
Increasing: No intervals exist. Decreasing: $(-\infty, 5)$
No inflection points exist.
Concave up: No intervals exist. Concave down: $(-\infty, 5)$
No relative minima. No relative maxima.

708)



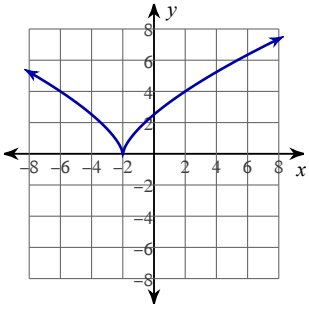
x-intercepts at $x = 1 - 2\sqrt{7}, 1, 1 + 2\sqrt{7}$ y-intercept at $y = \frac{9}{2}$
No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical points at: $x = -1, 1, 3$
Increasing: $(-\infty, -1), (3, \infty)$ Decreasing: $(-1, 3)$
Inflection point at: $x = 1$
Concave up: $(1, \infty)$ Concave down: $(-\infty, 1)$
Relative minimum: $(3, -4\sqrt[3]{2})$ Relative maximum: $(-1, 4\sqrt[3]{2})$

709)



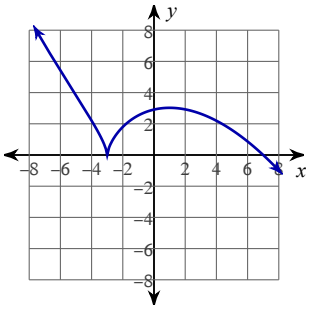
x-intercept at $x = 1$ y-intercept at $y = -\sqrt[3]{3}$
No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical point at: $x = 1$
Increasing: $(-\infty, \infty)$ Decreasing: No intervals exist.
Inflection point at: $x = 1$
Concave up: $(-\infty, 1)$ Concave down: $(1, \infty)$
No relative minima. No relative maxima.

710)



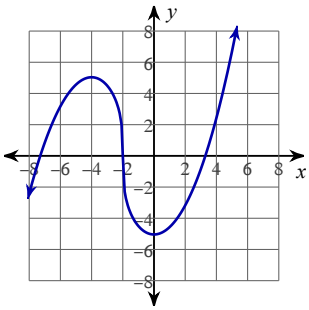
x-intercept at $x = -2$ y-intercept at $y = 2\sqrt[3]{2}$
No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical point at: $x = -2$
Increasing: $(-2, \infty)$ Decreasing: $(-\infty, -2)$
No inflection points exist.
Concave up: No intervals exist. Concave down: $(-\infty, -2), (-2, \infty)$
Relative minimum: $(-2, 0)$ No relative maxima.

711)



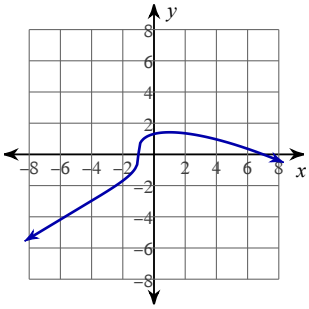
x-intercepts at $x = -3, 7$ y-intercept at $y = \frac{7\sqrt[3]{9}}{5}$
No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical points at: $x = -3, 1$
Increasing: $(-3, 1)$ Decreasing: $(-\infty, -3), (1, \infty)$
Inflection point at: $x = -5$
Concave up: $(-\infty, -5)$ Concave down: $(-5, -3), (-3, \infty)$
Relative minimum: $(-3, 0)$ Relative maximum: $\left(1, \frac{12\sqrt[3]{2}}{5}\right)$

712)



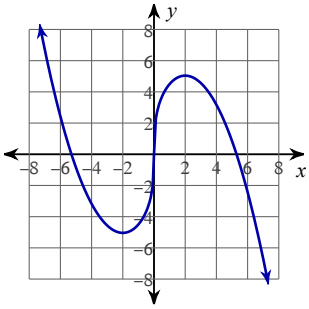
x-intercepts at $x = -2 - 2\sqrt{7}, -2, -2 + 2\sqrt{7}$ y-intercept at $y = -4\sqrt[3]{2}$
No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical points at: $x = -4, -2, 0$
Increasing: $(-\infty, -4), (0, \infty)$ Decreasing: $(-4, 0)$
Inflection point at: $x = -2$
Concave up: $(-2, \infty)$ Concave down: $(-\infty, -2)$
Relative minimum: $(0, -4\sqrt[3]{2})$ Relative maximum: $(-4, 4\sqrt[3]{2})$

713)



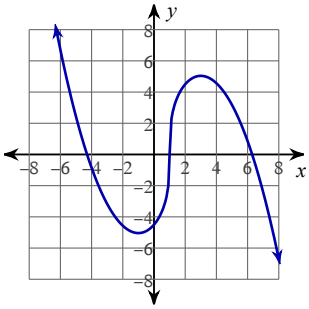
x-intercepts at $x = -1, 7$ y-intercept at $y = \frac{21}{16}$
No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical points at: $x = -1, 1$
Increasing: $(-\infty, 1)$ Decreasing: $(1, \infty)$
Inflection points at: $x = -5, -1$
Concave up: $(-5, -1)$ Concave down: $(-\infty, -5), (-1, \infty)$
No relative minima. Relative maximum: $\left(1, \frac{9\sqrt[3]{2}}{8}\right)$

714)



x-intercepts at $x = -2\sqrt{7}, 0, 2\sqrt{7}$ y-intercept at $y = 0$
No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical points at: $x = -2, 0, 2$
Increasing: $(-2, 2)$ Decreasing: $(-\infty, -2), (2, \infty)$
Inflection point at: $x = 0$
Concave up: $(-\infty, 0)$ Concave down: $(0, \infty)$
Relative minimum: $(-2, -4\sqrt[3]{2})$ Relative maximum: $(2, 4\sqrt[3]{2})$

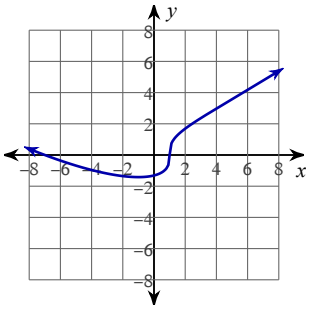
715)



x-intercepts at $x = 1 - 2\sqrt{7},\ 1,\ 1 + 2\sqrt{7}$ y-intercept at $y = -\frac{9}{2}$

No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical points at: $x = -1,\ 1,\ 3$
Increasing: $(-1,\ 3)$ Decreasing: $(-\infty,\ -1),\ (3,\ \infty)$
Inflection point at: $x = 1$
Concave up: $(-\infty,\ 1)$ Concave down: $(1,\ \infty)$
Relative minimum: $\left(-1,\ -4\sqrt[3]{2}\right)$ Relative maximum: $\left(3,\ 4\sqrt[3]{2}\right)$

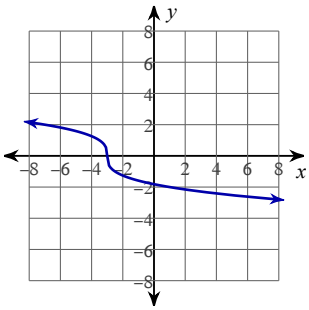
716)



x-intercepts at $x = -7,\ 1$ y-intercept at $y = -\frac{21}{16}$

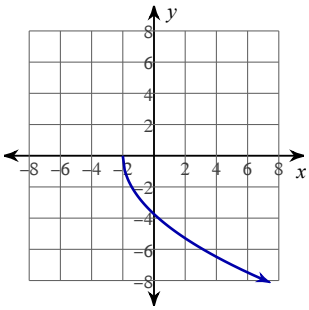
No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical points at: $x = -1,\ 1$
Increasing: $(-1,\ \infty)$ Decreasing: $(-\infty,\ -1)$
Inflection points at: $x = 1,\ 5$
Concave up: $(-\infty,\ 1),\ (5,\ \infty)$ Concave down: $(1,\ 5)$
Relative minimum: $\left(-1,\ -\frac{9\sqrt[3]{2}}{8}\right)$ No relative maxima.

717)



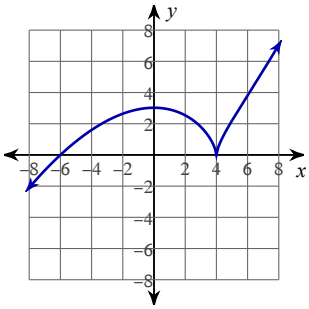
x-intercept at $x = -3$ y-intercept at $y = -\sqrt[3]{6}$
No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical point at: $x = -3$
Increasing: No intervals exist. Decreasing: $(-\infty,\ \infty)$
Inflection point at: $x = -3$
Concave up: $(-3,\ \infty)$ Concave down: $(-\infty,\ -3)$
No relative minima. No relative maxima.

718)



x-intercept at $x = -2$ y-intercept at $y = -\sqrt{14}$
No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical point at: $x = -2$
Increasing: No intervals exist. Decreasing: $(-2,\ \infty)$
No inflection points exist.
Concave up: $(-2,\ \infty)$ Concave down: No intervals exist.
No relative minima. No relative maxima.

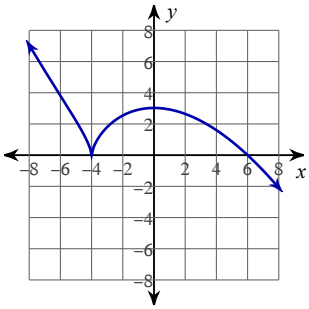
719)



x-intercepts at $x = -6,\ 4$ y-intercept at $y = \frac{12\sqrt[3]{2}}{5}$

No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical points at: $x = 0,\ 4$
Increasing: $(-\infty,\ 0),\ (4,\ \infty)$ Decreasing: $(0,\ 4)$
Inflection point at: $x = 6$
Concave up: $(6,\ \infty)$ Concave down: $(-\infty,\ 4),\ (4,\ 6)$
Relative minimum: $(4,\ 0)$ Relative maximum: $\left(0,\ \frac{12\sqrt[3]{2}}{5}\right)$

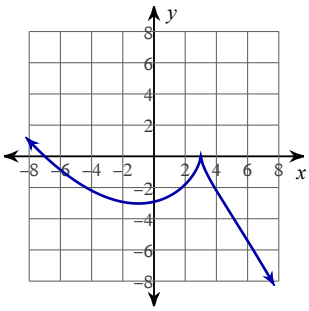
720)



x-intercepts at $x = -4, 6$ y-intercept at $y = \frac{12\sqrt[3]{2}}{5}$

No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical points at: $x = -4, 0$
Increasing: $(-4, 0)$ Decreasing: $(-\infty, -4), (0, \infty)$
Inflection point at: $x = -6$
Concave up: $(-\infty, -6)$ Concave down: $(-6, -4), (-4, \infty)$
Relative minimum: $(-4, 0)$ Relative maximum: $\left(0, \frac{12\sqrt[3]{2}}{5}\right)$

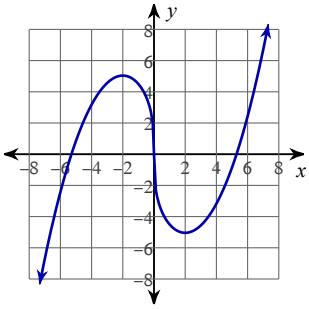
721)



x-intercepts at $x = -7, 3$ y-intercept at $y = -\frac{7\sqrt[3]{9}}{5}$

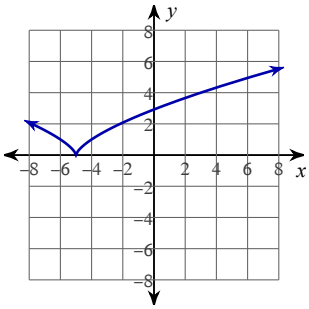
No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical points at: $x = -1, 3$
Increasing: $(-1, 3)$ Decreasing: $(-\infty, -1), (3, \infty)$
Inflection point at: $x = 5$
Concave up: $(-\infty, 3), (3, 5)$ Concave down: $(5, \infty)$
Relative minimum: $\left(-1, -\frac{12\sqrt[3]{2}}{5}\right)$ Relative maximum: $(3, 0)$

722)



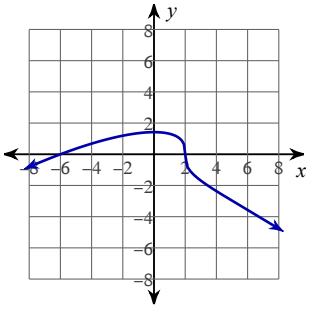
x-intercepts at $x = -2\sqrt{7}, 0, 2\sqrt{7}$ y-intercept at $y = 0$
No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical points at: $x = -2, 0, 2$
Increasing: $(-\infty, -2), (2, \infty)$ Decreasing: $(-2, 2)$
Inflection point at: $x = 0$
Concave up: $(0, \infty)$ Concave down: $(-\infty, 0)$
Relative minimum: $(2, -4\sqrt[3]{2})$ Relative maximum: $(-2, 4\sqrt[3]{2})$

723)



x-intercept at $x = -5$ y-intercept at $y = \sqrt[3]{25}$
No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical point at: $x = -5$
Increasing: $(-5, \infty)$ Decreasing: $(-\infty, -5)$
No inflection points exist.
Concave up: No intervals exist. Concave down: $(-\infty, -5), (-5, \infty)$
Relative minimum: $(-5, 0)$ No relative maxima.

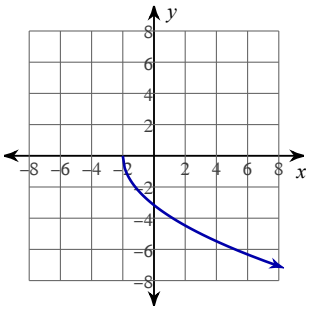
724)



x-intercepts at $x = -6, 2$ y-intercept at $y = \frac{9\sqrt[3]{2}}{8}$

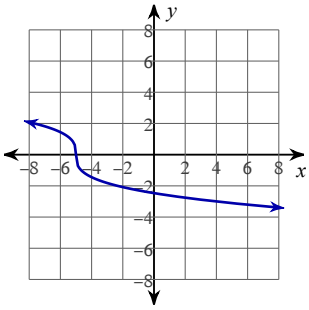
No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical points at: $x = 0, 2$
Increasing: $(-\infty, 0)$ Decreasing: $(0, \infty)$
Inflection points at: $x = 2, 6$
Concave up: $(2, 6)$ Concave down: $(-\infty, 2), (6, \infty)$
No relative minima. Relative maximum: $\left(0, \frac{9\sqrt[3]{2}}{8}\right)$

725)



x-intercept at $x = -2$ y-intercept at $y = -\sqrt{10}$
No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical point at: $x = -2$
Increasing: No intervals exist. Decreasing: $(-2, \infty)$
No inflection points exist.
Concave up: $(-2, \infty)$ Concave down: No intervals exist.
No relative minima. No relative maxima.

726)



x-intercept at $x = -5$ y-intercept at $y = -\sqrt[3]{15}$
No vertical asymptotes exist.
No horizontal asymptotes exist.
Critical point at: $x = -5$
Increasing: No intervals exist. Decreasing: $(-\infty, \infty)$
Inflection point at: $x = -5$
Concave up: $(-5, \infty)$ Concave down: $(-\infty, -5)$
No relative minima. No relative maxima.

727) 700

728) $-\frac{25}{4}$

729) 900

730) 75 ft (perpendicular to wall) by 150 ft (parallel to wall)

731) 800

732) −9

733) 100 ft (perpendicular to wall) by 200 ft (parallel to wall)

734) $\frac{10}{3}$ in

735) 400

736) 3 in

737) 2 in

738) 1000

739) 350

740) 25 ft (non-adjacent sides) by $\frac{100}{3}$ ft (adjacent sides)

741) 125 ft (perpendicular to wall) by 250 ft (parallel to wall)

742) 50 ft (non-adjacent sides) by $\frac{200}{3}$ ft (adjacent sides)

743) 25 ft (perpendicular to wall) by 50 ft (parallel to wall)

744) 700

745) 600

746) 50 ft (perpendicular to wall) by 100 ft (parallel to wall)

747) 12 in wide by 24 in tall

748) $\left(-\frac{\sqrt{6}}{2}, \frac{5}{2}\right), \left(\frac{\sqrt{6}}{2}, \frac{5}{2}\right)$

749) 49

750) 10 in wide by 20 in tall

751) 9

752) $\left(-\frac{\sqrt{10}}{2}, \frac{5}{2}\right), \left(\frac{\sqrt{10}}{2}, \frac{5}{2}\right)$

753) 18 ft by 18 ft by 9 ft tall

754) $\left(\frac{13}{2}, \frac{\sqrt{26}}{2}\right)$

755) $\left(\frac{3}{2}, \frac{\sqrt{6}}{2}\right)$

756) 36

757) 10 in wide by 20 in tall

758) $\left(-\frac{\sqrt{6}}{2}, \frac{7}{2}\right), \left(\frac{\sqrt{6}}{2}, \frac{7}{2}\right)$

759) $\left(\frac{1}{2}, \frac{\sqrt{2}}{2}\right)$

760) 16

761) 9 in wide by 18 in tall

762) 9 in wide by 18 in tall

763) $\left(-\frac{\sqrt{10}}{2}, \frac{9}{2}\right), \left(\frac{\sqrt{10}}{2}, \frac{9}{2}\right)$

764) 64

765) 12 ft by 12 ft by 6 ft tall

766) $\left(\frac{9}{2}, \frac{3\sqrt{2}}{2}\right)$

767) 6 ft from the short pole (or 12 ft from the long pole)

768) $\frac{36}{4+\pi}$ ft (width) by $\frac{18}{4+\pi}$ ft (height)

769) $\frac{40}{4+\pi}$ ft (width) by $\frac{20}{4+\pi}$ ft (height)

770) 6 ft from the short pole (or 18 ft from the long pole)

771) $\frac{20}{4+\pi}$ ft (width) by $\frac{10}{4+\pi}$ ft (height)

772) $\frac{32}{4+\pi}$ ft (width) by $\frac{16}{4+\pi}$ ft (height)

773) 5 ft from the short pole (or 15 ft from the long pole)

774) 6 ft from the short pole (or 15 ft from the long pole)

775) $\frac{16}{4+\pi}$ ft (width) by $\frac{8}{4+\pi}$ ft (height)

776) 12 ft from the short pole (or 24 ft from the long pole)

777) 9 ft from the short pole (or 18 ft from the long pole)

778) 8 ft from the short pole (or 16 ft from the long pole)

779) 8 ft from the short pole (or 16 ft from the long pole)

780) 15 ft from the short pole (or 30 ft from the long pole)

781) 6 ft from the short pole (or 9 ft from the long pole)

782) 4 ft from the short pole (or 12 ft from the long pole)

783) 12 ft from the short pole (or 36 ft from the long pole)

784) $\frac{24}{4+\pi}$ ft (width) by $\frac{12}{4+\pi}$ ft (height)

785) 12 ft from the short pole (or 16 ft from the long pole)

786) $\frac{28}{4+\pi}$ ft (width) by $\frac{14}{4+\pi}$ ft (height)

787) $v(t) = -3t^2 + 36t - 81$, $a(t) = -6t + 36$

788) $v(t) = 3t^2 - 24t$, $a(t) = 6t - 24$

789) $v(t) = 3t^2 - 40t + 100$, $a(t) = 6t - 40$

790) $v(t) = -3t^2 + 56t - 196$, $a(t) = -6t + 56$

791) $v(t) = -3t^2 + 22t$, $a(t) = -6t + 22$

792) $v(t) = 3t^2 - 20t$, $a(t) = 6t - 20$

793) $v(t) = -3t^2 + 32t - 64$, $a(t) = -6t + 32$

794) $v(t) = -3t^2 + 26t - 40$, $a(t) = -6t + 26$

795) $v(t) = 3t^2 - 46t + 120$, $a(t) = 6t - 46$

796) $v(t) = -3t^2 + 44t - 121$, $a(t) = -6t + 44$

797) Displacement: 30
Distance traveled: $\frac{61}{2} = 30.5$

798) Displacement: −7
Distance traveled: 25

799) Displacement: 0
Distance traveled: $\frac{121}{2} = 60.5$

800) Displacement: 27
Distance traveled: 45

801) Displacement: 18
Distance traveled: $\frac{45}{2} = 22.5$

802) Displacement: 0
Distance traveled: $\frac{25}{2} = 12.5$

803) Displacement: −36
Distance traveled: $\frac{97}{2} = 48.5$

804) Displacement: 24
Distance traveled: 26

805) Displacement: 30
Distance traveled: $\frac{61}{2} = 30.5$

806) Displacement: −27
Distance traveled: 45

807) Changes direction at: $t = \left\{3, \frac{35}{3}\right\}$, Moving left: $3 < t < \frac{35}{3}$, Moving right: $0 \le t < 3$, $t > \frac{35}{3}$
Acceleration zero at: $t = \left\{\frac{22}{3}\right\}$, Slowing down: $0 \le t < 3$, $\frac{22}{3} < t < \frac{35}{3}$, Speeding up: $3 < t < \frac{22}{3}$, $t > \frac{35}{3}$

808) Changes direction at: $t = \left\{2, \frac{20}{3}\right\}$, Moving left: $2 < t < \frac{20}{3}$, Moving right: $0 \le t < 2$, $t > \frac{20}{3}$

Acceleration zero at: $t = \left\{\frac{13}{3}\right\}$, Slowing down: $0 \le t < 2$, $\frac{13}{3} < t < \frac{20}{3}$, Speeding up: $2 < t < \frac{13}{3}$, $t > \frac{20}{3}$

809) Changes direction at: $t = \{5, 15\}$, Moving left: $5 < t < 15$, Moving right: $0 \le t < 5$, $t > 15$

Acceleration zero at: $t = \{10\}$, Slowing down: $0 \le t < 5$, $10 < t < 15$, Speeding up: $5 < t < 10$, $t > 15$

810) Changes direction at: $t = \{6\}$, Moving left: $0 \le t < 6$, Moving right: $t > 6$

Acceleration zero at: $t = \left\{\frac{4}{3}\right\}$, Slowing down: $\frac{4}{3} < t < 6$, Speeding up: $0 \le t < \frac{4}{3}$, $t > 6$

811) Changes direction at: $t = \{4, 12\}$, Moving left: $0 \le t < 4$, $t > 12$, Moving right: $4 < t < 12$

Acceleration zero at: $t = \{8\}$, Slowing down: $0 \le t < 4$, $8 < t < 12$, Speeding up: $4 < t < 8$, $t > 12$

812) Changes direction at: $t = \left\{\frac{22}{3}\right\}$, Moving left: $t > \frac{22}{3}$, Moving right: $0 < t < \frac{22}{3}$

Acceleration zero at: $t = \left\{\frac{11}{3}\right\}$, Slowing down: $\frac{11}{3} < t < \frac{22}{3}$, Speeding up: $0 < t < \frac{11}{3}$, $t > \frac{22}{3}$

813) Changes direction at: $t = \{6\}$, Moving left: $t > 6$, Moving right: $0 < t < 6$

Acceleration zero at: $t = \{3\}$, Slowing down: $3 < t < 6$, Speeding up: $0 < t < 3$, $t > 6$

814) Changes direction at: $t = \left\{\frac{26}{3}\right\}$, Moving left: $t > \frac{26}{3}$, Moving right: $0 < t < \frac{26}{3}$

Acceleration zero at: $t = \left\{\frac{13}{3}\right\}$, Slowing down: $\frac{13}{3} < t < \frac{26}{3}$, Speeding up: $0 < t < \frac{13}{3}$, $t > \frac{26}{3}$

815) Changes direction at: $t = \left\{\frac{14}{3}\right\}$, Moving left: $0 \le t < \frac{14}{3}$, Moving right: $t > \frac{14}{3}$

Acceleration zero at: $t = \left\{\frac{1}{3}\right\}$, Slowing down: $\frac{1}{3} < t < \frac{14}{3}$, Speeding up: $0 \le t < \frac{1}{3}$, $t > \frac{14}{3}$

816) Changes direction at: $t = \left\{3, \frac{35}{3}\right\}$, Moving left: $0 \le t < 3$, $t > \frac{35}{3}$, Moving right: $3 < t < \frac{35}{3}$

Acceleration zero at: $t = \left\{\frac{22}{3}\right\}$, Slowing down: $0 \le t < 3$, $\frac{22}{3} < t < \frac{35}{3}$, Speeding up: $3 < t < \frac{22}{3}$, $t > \frac{35}{3}$

817) A = area of circle r = radius t = time

Equation: $A = \pi r^2$ Given rate: $\frac{dr}{dt} = 6$ Find: $\left.\frac{dA}{dt}\right|_{r=3}$

$\left.\frac{dA}{dt}\right|_{r=3} = 2\pi r \cdot \frac{dr}{dt} = 36\pi$ m²/min

818) A = area of square s = length of sides t = time

Equation: $A = s^2$ Given rate: $\frac{ds}{dt} = 6$ Find: $\left.\frac{dA}{dt}\right|_{s=4}$

$\left.\frac{dA}{dt}\right|_{s=4} = 2s \cdot \frac{ds}{dt} = 48$ m²/min

819) A = area of square x = length of diagonals t = time

Equation: $A = \frac{x^2}{2}$ Given rate: $\frac{dx}{dt} = 3$ Find: $\left.\frac{dA}{dt}\right|_{x=6}$

$$\left.\frac{dA}{dt}\right|_{x=6} = x \cdot \frac{dx}{dt} = 18 \text{ m}^2/\text{min}$$

820) A = area of circle r = radius t = time

Equation: $A = \pi r^2$ Given rate: $\frac{dr}{dt} = 7$ Find: $\left.\frac{dA}{dt}\right|_{r=15}$

$$\left.\frac{dA}{dt}\right|_{r=15} = 2\pi r \cdot \frac{dr}{dt} = 210\pi \text{ cm}^2/\text{min}$$

821) A = area of circle r = radius t = time

Equation: $A = \pi r^2$ Given rate: $\frac{dr}{dt} = 9$ Find: $\left.\frac{dA}{dt}\right|_{r=8}$

$$\left.\frac{dA}{dt}\right|_{r=8} = 2\pi r \cdot \frac{dr}{dt} = 144\pi \text{ cm}^2/\text{min}$$

822) A = area of circle r = radius t = time

Equation: $A = \pi r^2$ Given rate: $\frac{dr}{dt} = 9$ Find: $\left.\frac{dA}{dt}\right|_{r=6}$

$$\left.\frac{dA}{dt}\right|_{r=6} = 2\pi r \cdot \frac{dr}{dt} = 108\pi \text{ cm}^2/\text{min}$$

823) A = area of circle r = radius t = time

Equation: $A = \pi r^2$ Given rate: $\frac{dr}{dt} = 9$ Find: $\left.\frac{dA}{dt}\right|_{r=14}$

$$\left.\frac{dA}{dt}\right|_{r=14} = 2\pi r \cdot \frac{dr}{dt} = 252\pi \text{ ft}^2/\text{sec}$$

824) A = area of square x = length of diagonals t = time

Equation: $A = \frac{x^2}{2}$ Given rate: $\frac{dx}{dt} = 5$ Find: $\left.\frac{dA}{dt}\right|_{x=15}$

$$\left.\frac{dA}{dt}\right|_{x=15} = x \cdot \frac{dx}{dt} = 75 \text{ m}^2/\text{min}$$

825) A = area of square x = length of diagonals t = time

Equation: $A = \frac{x^2}{2}$ Given rate: $\frac{dx}{dt} = 5$ Find: $\left.\frac{dA}{dt}\right|_{x=12}$

$$\left.\frac{dA}{dt}\right|_{x=12} = x \cdot \frac{dx}{dt} = 60 \text{ m}^2/\text{min}$$

826) A = area of square s = length of sides t = time

Equation: $A = s^2$ Given rate: $\frac{ds}{dt} = 9$ Find: $\left.\frac{dA}{dt}\right|_{s=12}$

$$\left.\frac{dA}{dt}\right|_{s=12} = 2s \cdot \frac{ds}{dt} = 216 \text{ m}^2/\text{min}$$

827) A = area of square s = length of sides t = time

Equation: $A = s^2$ Given rate: $\frac{ds}{dt} = 2$ Find: $\left.\frac{dA}{dt}\right|_{s=6}$

$$\left.\frac{dA}{dt}\right|_{s=6} = 2s \cdot \frac{ds}{dt} = 24 \text{ m}^2/\text{min}$$

828) A = area of circle r = radius t = time

Equation: $A = \pi r^2$ Given rate: $\frac{dr}{dt} = 8$ Find: $\left.\frac{dA}{dt}\right|_{r=7}$

$$\left.\frac{dA}{dt}\right|_{r=7} = 2\pi r \cdot \frac{dr}{dt} = 112\pi \text{ m}^2/\text{min}$$

829) A = area of circle r = radius t = time

Equation: $A = \pi r^2$ Given rate: $\frac{dr}{dt} = 9$ Find: $\left.\frac{dA}{dt}\right|_{r=7}$

$$\left.\frac{dA}{dt}\right|_{r=7} = 2\pi r \cdot \frac{dr}{dt} = 126\pi \text{ ft}^2/\text{sec}$$

830) A = area of circle r = radius t = time

Equation: $A = \pi r^2$ Given rate: $\frac{dr}{dt} = 8$ Find: $\left.\frac{dA}{dt}\right|_{r=5}$

$$\left.\frac{dA}{dt}\right|_{r=5} = 2\pi r \cdot \frac{dr}{dt} = 80\pi \text{ ft}^2/\text{sec}$$

831) A = area of circle r = radius t = time

Equation: $A = \pi r^2$ Given rate: $\frac{dr}{dt} = 9$ Find: $\left.\frac{dA}{dt}\right|_{r=13}$

$$\left.\frac{dA}{dt}\right|_{r=13} = 2\pi r \cdot \frac{dr}{dt} = 234\pi \text{ m}^2/\text{min}$$

832) A = area of square s = length of sides t = time

Equation: $A = s^2$ Given rate: $\frac{ds}{dt} = 7$ Find: $\left.\frac{dA}{dt}\right|_{s=13}$

$$\left.\frac{dA}{dt}\right|_{s=13} = 2s \cdot \frac{ds}{dt} = 182 \text{ m}^2/\text{min}$$

833) A = area of square x = length of diagonals t = time

Equation: $A = \frac{x^2}{2}$ Given rate: $\frac{dx}{dt} = 8$ Find: $\left.\frac{dA}{dt}\right|_{x=5}$

$$\left.\frac{dA}{dt}\right|_{x=5} = x \cdot \frac{dx}{dt} = 40 \text{ m}^2/\text{min}$$

834) A = area of circle r = radius t = time

Equation: $A = \pi r^2$ Given rate: $\frac{dr}{dt} = 8$ Find: $\left.\frac{dA}{dt}\right|_{r=11}$

$$\left.\frac{dA}{dt}\right|_{r=11} = 2\pi r \cdot \frac{dr}{dt} = 176\pi \text{ cm}^2/\text{min}$$

835) A = area of circle r = radius t = time

Equation: $A = \pi r^2$ Given rate: $\frac{dr}{dt} = 2$ Find: $\left.\frac{dA}{dt}\right|_{r=6}$

$$\left.\frac{dA}{dt}\right|_{r=6} = 2\pi r \cdot \frac{dr}{dt} = 24\pi \text{ cm}^2/\text{min}$$

836) A = area of square x = length of diagonals t = time

Equation: $A = \frac{x^2}{2}$ Given rate: $\frac{dx}{dt} = 3$ Find: $\left.\frac{dA}{dt}\right|_{x=14}$

$$\left.\frac{dA}{dt}\right|_{x=14} = x \cdot \frac{dx}{dt} = 42 \text{ m}^2/\text{min}$$

837) V = volume of material in cone h = height t = time

Equation: $V = \frac{\pi h^3}{12}$ Given rate: $\frac{dh}{dt} = -4$ Find: $\left.\frac{dV}{dt}\right|_{h=5}$

$$\left.\frac{dV}{dt}\right|_{h=5} = \frac{\pi h^2}{4} \cdot \frac{dh}{dt} = -25\pi \text{ cm}^3/\text{sec}$$

838) V = volume of cube s = length of sides t = time

Equation: $V = s^3$ Given rate: $\frac{dV}{dt} = 8$ Find: $\left.\frac{ds}{dt}\right|_{s=4}$

$$\left.\frac{ds}{dt}\right|_{s=4} = \frac{1}{3s^2} \cdot \frac{dV}{dt} = \frac{1}{6} \text{ m/min}$$

839) V = volume of cube s = length of sides t = time

Equation: $V = s^3$ Given rate: $\frac{dV}{dt} = 27$ Find: $\left.\frac{ds}{dt}\right|_{s=2}$

$$\left.\frac{ds}{dt}\right|_{s=2} = \frac{1}{3s^2} \cdot \frac{dV}{dt} = \frac{9}{4} \text{ m/min}$$

840) V = volume of cube s = length of sides t = time

Equation: $V = s^3$ Given rate: $\frac{dV}{dt} = 64$ Find: $\left.\frac{ds}{dt}\right|_{s=3}$

$$\left.\frac{ds}{dt}\right|_{s=3} = \frac{1}{3s^2} \cdot \frac{dV}{dt} = \frac{64}{27} \text{ m/min}$$

841) V = volume of sphere r = radius t = time

Equation: $V = \frac{4}{3}\pi r^3$ Given rate: $\frac{dr}{dt} = 4$ Find: $\left.\frac{dV}{dt}\right|_{r=5}$

$$\left.\frac{dV}{dt}\right|_{r=5} = 4\pi r^2 \cdot \frac{dr}{dt} = 400\pi \text{ cm}^3\text{/sec}$$

842) V = volume of cube s = length of sides t = time

Equation: $V = s^3$ Given rate: $\frac{ds}{dt} = 4$ Find: $\left.\frac{dV}{dt}\right|_{s=7}$

$$\left.\frac{dV}{dt}\right|_{s=7} = 3s^2 \cdot \frac{ds}{dt} = 588 \text{ m}^3\text{/min}$$

843) V = volume of sphere r = radius t = time

Equation: $V = \frac{4}{3}\pi r^3$ Given rate: $\frac{dV}{dt} = -36\pi$ Find: $\left.\frac{dr}{dt}\right|_{r=4}$

$$\left.\frac{dr}{dt}\right|_{r=4} = \frac{1}{4\pi r^2} \cdot \frac{dV}{dt} = -\frac{9}{16} \text{ cm/sec}$$

844) V = volume of cube s = length of sides t = time

Equation: $V = s^3$ Given rate: $\frac{ds}{dt} = 4$ Find: $\left.\frac{dV}{dt}\right|_{s=6}$

$$\left.\frac{dV}{dt}\right|_{s=6} = 3s^2 \cdot \frac{ds}{dt} = 432 \text{ m}^3\text{/min}$$

845) V = volume of sphere r = radius t = time

Equation: $V = \frac{4}{3}\pi r^3$ Given rate: $\frac{dV}{dt} = -\frac{32\pi}{3}$ Find: $\left.\frac{dr}{dt}\right|_{r=3}$

$$\left.\frac{dr}{dt}\right|_{r=3} = \frac{1}{4\pi r^2} \cdot \frac{dV}{dt} = -\frac{8}{27} \text{ cm/sec}$$

846) V = volume of sphere r = radius t = time

Equation: $V = \frac{4}{3}\pi r^3$ Given rate: $\frac{dV}{dt} = -\frac{256\pi}{3}$ Find: $\left.\frac{dr}{dt}\right|_{r=7}$

$$\left.\frac{dr}{dt}\right|_{r=7} = \frac{1}{4\pi r^2} \cdot \frac{dV}{dt} = -\frac{64}{147} \text{ in/s}$$

847) V = volume of sphere r = radius t = time

Equation: $V = \frac{4}{3}\pi r^3$ Given rate: $\frac{dr}{dt} = -2$ Find: $\left.\frac{dV}{dt}\right|_{r=7}$

$$\left.\frac{dV}{dt}\right|_{r=7} = 4\pi r^2 \cdot \frac{dr}{dt} = -392\pi \text{ cm}^3/\text{sec}$$

848) V = volume of material in cone h = height t = time

Equation: $V = 3\pi h^3$ Given rate: $\frac{dh}{dt} = -4$ Find: $\left.\frac{dV}{dt}\right|_{h=2}$

$$\left.\frac{dV}{dt}\right|_{h=2} = 9\pi h^2 \cdot \frac{dh}{dt} = -144\pi \text{ cm}^3/\text{sec}$$

849) V = volume of sphere r = radius t = time

Equation: $V = \frac{4}{3}\pi r^3$ Given rate: $\frac{dV}{dt} = \frac{256\pi}{3}$ Find: $\left.\frac{dr}{dt}\right|_{r=3}$

$$\left.\frac{dr}{dt}\right|_{r=3} = \frac{1}{4\pi r^2} \cdot \frac{dV}{dt} = \frac{64}{27} \text{ cm/sec}$$

850) V = volume of sphere r = radius t = time

Equation: $V = \frac{4}{3}\pi r^3$ Given rate: $\frac{dr}{dt} = -4$ Find: $\left.\frac{dV}{dt}\right|_{r=6}$

$$\left.\frac{dV}{dt}\right|_{r=6} = 4\pi r^2 \cdot \frac{dr}{dt} = -576\pi \text{ in}^3/\text{sec}$$

851) V = volume of material in cone h = height t = time

Equation: $V = 3\pi h^3$ Given rate: $\frac{dh}{dt} = -3$ Find: $\left.\frac{dV}{dt}\right|_{h=9}$

$$\left.\frac{dV}{dt}\right|_{h=9} = 9\pi h^2 \cdot \frac{dh}{dt} = -2187\pi \text{ cm}^3/\text{sec}$$

852) V = volume of cube s = length of sides t = time

Equation: $V = s^3$ Given rate: $\frac{ds}{dt} = 3$ Find: $\left.\frac{dV}{dt}\right|_{s=2}$

$$\left.\frac{dV}{dt}\right|_{s=2} = 3s^2 \cdot \frac{ds}{dt} = 36 \text{ m}^3/\text{min}$$

853) V = volume of sphere r = radius t = time

Equation: $V = \frac{4}{3}\pi r^3$ Given rate: $\frac{dV}{dt} = -\frac{256\pi}{3}$ Find: $\left.\frac{dr}{dt}\right|_{r=6}$

$$\left.\frac{dr}{dt}\right|_{r=6} = \frac{1}{4\pi r^2} \cdot \frac{dV}{dt} = -\frac{16}{27} \text{ in/s}$$

854) V = volume of material in cone h = height t = time

Equation: $V = 3\pi h^3$ Given rate: $\frac{dh}{dt} = -3$ Find: $\left.\frac{dV}{dt}\right|_{h=3}$

$$\left.\frac{dV}{dt}\right|_{h=3} = 9\pi h^2 \cdot \frac{dh}{dt} = -243\pi \text{ cm}^3/\text{sec}$$

855) V = volume of material in cone h = height t = time

Equation: $V = 3\pi h^3$ Given rate: $\frac{dh}{dt} = -4$ Find: $\left.\frac{dV}{dt}\right|_{h=8}$

$$\left.\frac{dV}{dt}\right|_{h=8} = 9\pi h^2 \cdot \frac{dh}{dt} = -2304\pi \text{ cm}^3/\text{sec}$$

856) V = volume of cube s = length of sides t = time

Equation: $V = s^3$ Given rate: $\frac{ds}{dt} = 3$ Find: $\left.\frac{dV}{dt}\right|_{s=5}$

$$\left.\frac{dV}{dt}\right|_{s=5} = 3s^2 \cdot \frac{ds}{dt} = 225 \text{ m}^3/\text{min}$$

857) x = horizontal distance from base of ladder to wall y = vertical distance from top of ladder to floor t = time

Equation: $x^2 + y^2 = 17^2$ Given rate: $\frac{dy}{dt} = -\frac{7}{y}$ Find: $\left.\frac{dx}{dt}\right|_{x=15}$

$$\left.\frac{dx}{dt}\right|_{x=15} = -\frac{y}{x} \cdot \frac{dy}{dt} = \frac{7}{15} \text{ ft/sec}$$

858) V = volume of cube s = length of sides t = time

Equation: $V = s^3$ Given rate: $\frac{dV}{dt} = \frac{64}{V}$ Find: $\left.\frac{ds}{dt}\right|_{s=2}$

$$\left.\frac{ds}{dt}\right|_{s=2} = \frac{1}{3s^2} \cdot \frac{dV}{dt} = \frac{2}{3} \text{ m/min}$$

859) V = volume of material in cone h = height t = time

Equation: $V = \frac{\pi h^3}{27}$ Given rate: $\frac{dV}{dt} = \frac{2\pi}{3V}$ Find: $\left.\frac{dh}{dt}\right|_{h=3}$

$$\left.\frac{dh}{dt}\right|_{h=3} = \frac{9}{\pi h^2} \cdot \frac{dV}{dt} = \frac{2}{3\pi} \text{ cm/sec}$$

860) V = volume of sphere r = radius t = time

Equation: $V = \frac{4}{3}\pi r^3$ Given rate: $\frac{dr}{dt} = -\frac{4}{r}$ Find: $\left.\frac{dV}{dt}\right|_{r=4}$

$$\left.\frac{dV}{dt}\right|_{r=4} = 4\pi r^2 \cdot \frac{dr}{dt} = -64\pi \text{ in}^3/\text{sec}$$

861) V = volume of cube s = length of sides t = time

Equation: $V = s^3$ Given rate: $\frac{ds}{dt} = \frac{2}{s}$ Find: $\left.\frac{dV}{dt}\right|_{s=8}$

$$\left.\frac{dV}{dt}\right|_{s=8} = 3s^2 \cdot \frac{ds}{dt} = 48 \text{ m}^3/\text{min}$$

862) a = altitude of rocket θ = angle of elevation from observer to rocket t = time

Equation: $\tan\theta = \frac{a}{800}$ Given rate: $\frac{da}{dt} = \frac{60000}{a}$ Find: $\left.\frac{d\theta}{dt}\right|_{a=600}$

$$\left.\frac{d\theta}{dt}\right|_{a=600} = \frac{1}{800\sec^2\theta} \cdot \frac{da}{dt} = \frac{2}{25} \text{ radians/sec}$$

863) A = area of square s = length of sides t = time

Equation: $A = s^2$ Given rate: $\frac{ds}{dt} = \frac{9}{s}$ Find: $\left.\frac{dA}{dt}\right|_{s=14}$

$$\left.\frac{dA}{dt}\right|_{s=14} = 2s \cdot \frac{ds}{dt} = 18 \text{ m}^2/\text{min}$$

864) A = area of square x = length of diagonals t = time

Equation: $A = \frac{x^2}{2}$ Given rate: $\frac{dx}{dt} = \frac{4}{x}$ Find: $\left.\frac{dA}{dt}\right|_{x=7}$

$$\left.\frac{dA}{dt}\right|_{x=7} = x \cdot \frac{dx}{dt} = 4 \text{ m}^2/\text{min}$$

865) A = area of circle r = radius t = time

Equation: $A = \pi r^2$ Given rate: $\frac{dr}{dt} = -\frac{7}{r}$ Find: $\left.\frac{dA}{dt}\right|_{r=15}$

$$\left.\frac{dA}{dt}\right|_{r=15} = 2\pi r \cdot \frac{dr}{dt} = -14\pi \text{ in}^2/\text{hr}$$

866) A = area of square s = length of sides t = time

Equation: $A = s^2$ Given rate: $\frac{dA}{dt} = \frac{9}{A}$ Find: $\left.\frac{ds}{dt}\right|_{s=4}$

$$\left.\frac{ds}{dt}\right|_{s=4} = \frac{1}{2s} \cdot \frac{dA}{dt} = \frac{9}{128} \text{ m/min}$$

867) V = volume of sphere r = radius t = time

Equation: $V = \frac{4}{3}\pi r^3$ Given rate: $\frac{dr}{dt} = -\frac{2}{r}$ Find: $\left.\frac{dV}{dt}\right|_{r=9}$

$$\left.\frac{dV}{dt}\right|_{r=9} = 4\pi r^2 \cdot \frac{dr}{dt} = -72\pi \text{ cm}^3/\text{sec}$$

868) A = area of square s = length of sides t = time

Equation: $A = s^2$ Given rate: $\frac{ds}{dt} = \frac{6}{s}$ Find: $\left.\frac{dA}{dt}\right|_{s=3}$

$$\left.\frac{dA}{dt}\right|_{s=3} = 2s \cdot \frac{ds}{dt} = 12 \text{ m}^2/\text{min}$$

869) A = area of square x = length of diagonals t = time

Equation: $A = \frac{x^2}{2}$ Given rate: $\frac{dA}{dt} = -\frac{25}{2A}$ Find: $\left.\frac{dx}{dt}\right|_{x=4}$

$$\left.\frac{dx}{dt}\right|_{x=4} = \frac{1}{x} \cdot \frac{dA}{dt} = -\frac{25}{64} \text{ m/min}$$

870) V = volume of material in cone h = height t = time

Equation: $V = \frac{\pi h^3}{3}$ Given rate: $\frac{dh}{dt} = \frac{3}{h}$ Find: $\left.\frac{dV}{dt}\right|_{h=8}$

$$\left.\frac{dV}{dt}\right|_{h=8} = \pi h^2 \cdot \frac{dh}{dt} = 24\pi \text{ cm}^3/\text{sec}$$

871) V = volume of sphere r = radius t = time

Equation: $V = \frac{4}{3}\pi r^3$ Given rate: $\frac{dr}{dt} = \frac{2}{r}$ Find: $\left.\frac{dV}{dt}\right|_{r=8}$

$$\left.\frac{dV}{dt}\right|_{r=8} = 4\pi r^2 \cdot \frac{dr}{dt} = 64\pi \text{ in}^3/\text{sec}$$

872) V = volume of sphere r = radius t = time

Equation: $V = \frac{4}{3}\pi r^3$ Given rate: $\frac{dr}{dt} = \frac{4}{r}$ Find: $\left.\frac{dV}{dt}\right|_{r=7}$

$$\left.\frac{dV}{dt}\right|_{r=7} = 4\pi r^2 \cdot \frac{dr}{dt} = 112\pi \text{ in}^3/\text{sec}$$

873) V = volume of material in cone h = height t = time

Equation: $V = \frac{\pi h^3}{3}$ Given rate: $\frac{dh}{dt} = \frac{3}{h}$ Find: $\left.\frac{dV}{dt}\right|_{h=6}$

$$\left.\frac{dV}{dt}\right|_{h=6} = \pi h^2 \cdot \frac{dh}{dt} = 18\pi \text{ cm}^3/\text{sec}$$

874) A = area of circle r = radius t = time

Equation: $A = \pi r^2$ Given rate: $\frac{dr}{dt} = \frac{3}{r}$ Find: $\left.\frac{dA}{dt}\right|_{r=7}$

$$\left.\frac{dA}{dt}\right|_{r=7} = 2\pi r \cdot \frac{dr}{dt} = 6\pi \text{ cm}^2/\text{min}$$

875) V = volume of cube s = length of sides t = time

Equation: $V = s^3$ Given rate: $\frac{ds}{dt} = \frac{2}{s}$ Find: $\left.\frac{dV}{dt}\right|_{s=4}$

$$\left.\frac{dV}{dt}\right|_{s=4} = 3s^2 \cdot \frac{ds}{dt} = 24 \text{ m}^3/\text{min}$$

876) V = volume of sphere r = radius t = time

Equation: $V = \frac{4}{3}\pi r^3$ Given rate: $\frac{dr}{dt} = \frac{3}{r}$ Find: $\left.\frac{dV}{dt}\right|_{r=6}$

$$\left.\frac{dV}{dt}\right|_{r=6} = 4\pi r^2 \cdot \frac{dr}{dt} = 72\pi \text{ cm}^3/\text{sec}$$

877) a = altitude of rocket θ = angle of elevation from observer to rocket t = time

Equation: $\tan\theta = \frac{a}{400}$ Given rate: $\frac{da}{dt} = \frac{40000}{a}$ Find: $\left.\frac{d\theta}{dt}\right|_{a=300}$

$$\left.\frac{d\theta}{dt}\right|_{a=300} = \frac{1}{400\sec^2\theta} \cdot \frac{da}{dt} = \frac{16}{75} \text{ radians/sec}$$

878) a = altitute of rocket z = distance from observer to rocket t = time

Equation: $a^2 + 490000 = z^2$ Given rate: $\frac{da}{dt} = 800$ Find: $\left.\frac{dz}{dt}\right|_{a=2400}$

$$\left.\frac{dz}{dt}\right|_{a=2400} = \frac{a}{z} \cdot \frac{da}{dt} = 768 \text{ ft/sec}$$

879) x = horizontal distance from base of ladder to wall y = vertical distance from top of ladder to floor t = time

Equation: $x^2 + y^2 = 10^2$ Given rate: $\frac{dx}{dt} = \frac{4}{x}$ Find: $\left.\frac{dy}{dt}\right|_{y=6}$

$$\left.\frac{dy}{dt}\right|_{y=6} = -\frac{x}{y} \cdot \frac{dx}{dt} = -\frac{2}{3} \text{ m/sec, therefore: } \frac{2}{3} \text{ m/sec down the wall}$$

880) x = distance from person to lamppost y = length of shadow t = time

Equation: $\frac{x+y}{17} = \frac{y}{7}$ Given rate: $\frac{dx}{dt} = 4$ Find: $\left.\frac{dy}{dt}\right|_{x=11}$

$$\left.\frac{dy}{dt}\right|_{x=11} = \frac{7}{10} \cdot \frac{dx}{dt} = \frac{14}{5} \text{ ft/sec}$$

881) x = horizontal distance from base of ladder to wall y = vertical distance from top of ladder to floor t = time

Equation: $x^2 + y^2 = 25^2$ Given rate: $\frac{dy}{dt} = -\frac{3}{y}$ Find: $\left.\frac{dx}{dt}\right|_{x=7}$

$$\left.\frac{dx}{dt}\right|_{x=7} = -\frac{y}{x} \cdot \frac{dy}{dt} = \frac{3}{7} \text{ ft/sec}$$

882) x = horizontal distance from base of ladder to wall y = vertical distance from top of ladder to floor t = time

Equation: $x^2 + y^2 = 17^2$ Given rate: $\frac{dy}{dt} = -6$ Find: $\left.\frac{dx}{dt}\right|_{x=8}$

$\left.\frac{dx}{dt}\right|_{x=8} = -\frac{y}{x} \cdot \frac{dy}{dt} = \frac{45}{4}$ m/sec

883) a = altitute of rocket z = distance from observer to rocket t = time

Equation: $a^2 + 90000 = z^2$ Given rate: $\frac{da}{dt} = \frac{50000}{a}$ Find: $\left.\frac{dz}{dt}\right|_{a=400}$

$\left.\frac{dz}{dt}\right|_{a=400} = \frac{a}{z} \cdot \frac{da}{dt} = 100$ m/sec

884) a = altitude of rocket θ = angle of elevation from observer to rocket t = time

Equation: $\tan\theta = \frac{a}{1200}$ Given rate: $\frac{da}{dt} = 300$ Find: $\left.\frac{d\theta}{dt}\right|_{a=500}$

$\left.\frac{d\theta}{dt}\right|_{a=500} = \frac{1}{1200\sec^2\theta} \cdot \frac{da}{dt} = \frac{36}{169}$ radians/sec

885) x = distance from person to lamppost y = length of shadow t = time

Equation: $\frac{x+y}{18} = \frac{y}{5}$ Given rate: $\frac{dx}{dt} = -4$ Find: $\left.\frac{dy}{dt}\right|_{x=13}$

$\left.\frac{dy}{dt}\right|_{x=13} = \frac{5}{13} \cdot \frac{dx}{dt} = -\frac{20}{13}$ ft/sec

886) x = distance from person to lamppost y = length of shadow t = time

Equation: $\frac{x+y}{17} = \frac{y}{6}$ Given rate: $\frac{dx}{dt} = -\frac{3}{x}$ Find: $\left.\frac{dy}{dt}\right|_{x=10}$

$\left.\frac{dy}{dt}\right|_{x=10} = \frac{6}{11} \cdot \frac{dx}{dt} = -\frac{9}{55}$ ft/sec

887) x = distance from person to lamppost y = length of shadow t = time

Equation: $\frac{x+y}{17} = \frac{y}{6}$ Given rate: $\frac{dx}{dt} = \frac{6}{x}$ Find: $\left.\frac{dy}{dt}\right|_{x=11}$

$\left.\frac{dy}{dt}\right|_{x=11} = \frac{6}{11} \cdot \frac{dx}{dt} = \frac{36}{121}$ ft/sec

888) x = horizontal distance from base of ladder to wall y = vertical distance from top of ladder to floor t = time

Equation: $x^2 + y^2 = 5^2$ Given rate: $\frac{dx}{dt} = 2$ Find: $\left.\frac{dy}{dt}\right|_{y=3}$

$\left.\frac{dy}{dt}\right|_{y=3} = -\frac{x}{y} \cdot \frac{dx}{dt} = -\frac{8}{3}$ m/sec, therefore: $\frac{8}{3}$ m/sec down the wall

889) $\frac{5}{4}$ 890) $\frac{4}{3}$ 891) 3 892) 0 *

893) ∞ 894) 2 895) 5 896) 2

897) 1

898) $\frac{1}{5}$

899) 1

900) 0

901) 0

902) 6

903) $\frac{3}{2}$

904) 0

905) $-\frac{1}{2}$

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