201-SH2-AB - Exercises #15 - Asymptotes

Find all the vertical and horizontal asymptotes (if any) for each function.

(1) $f(x) = \dfrac{x^2 - 3x - 4}{3x^2 - 7x + 2}$

(2) $f(x) = \dfrac{2(x^2+1)(3-x)}{(x+1)(x^2-4)}$

(3) $f(x) = \dfrac{3x+5}{x^2+x+1}$

(4) $f(x) = \dfrac{(x^2+1)^2}{x^3+25x}$

(5) $f(x) = \dfrac{x^2+5x-14}{x^2-5x+6}$

(6) $f(x) = \dfrac{2(2x^2+1)(x+42)}{x^3-x^2-9x+9}$

(7) $f(x) = \dfrac{(x^3+2)\,(2x-7)^3}{(x+1)^4\,(2x^2-9x+4)}$

*(8) $f(x) = \dfrac{2e^x + e^{-x}}{e^x - 4e^{-x}}$

*(9) $f(x) = \dfrac{18x-7}{\sqrt{25x^2-1} - 4x}$

ANSWERS:

(1) v.a.: $x = 1/3, \quad x = 2$
h.a.: $y = 1/3$

(2) v.a.: $x = -2,\ x = -1,\ x = 2$
h.a.: $y = -2$

(3) v.a.: none
h.a.: $y = 0$

(4) v.a.: $x = 0$
h.a.: none

(5) v.a.: $x = 3$
h.a.: $y = 1$

(6) v.a.: $x = -3,\ x = 1,\ x = 3$
h.a.: $y = 4$

(7) v.a.: $x = -1,\ 1/2,\ 4$
h.a.: $y = 4$

(8) v.a.: $x = \ln(4)/2 = \ln(2)$
h.a.: $y = -1/2,\ y = 2$

(9) v.a.: $x = -1/3,\ x = 1/3$
h.a.: $y = -2,\ y = 18$