Worksheet 59 - Rational Functions

1. Which of the following are rational functions, explain why or why not.

   (a) $f(x) = \dfrac{3x^2 - 5x + 1}{x^{19} - 2}$

   (b) $f(x) = -5x^7 + 3x^4 - 10$

   (c) $f(x) = \dfrac{\pi x^3 - \sqrt{2}}{e^3}$

   (d) $f(x) = \dfrac{x^{4/3} - x^{5/4}}{x^2 - 9}$

2. Give the x and y-coordinates of any holes, list all zeros, and vertical asymptotes for the following rational functions:

   (a) $f(x) = \dfrac{(2x - 4)(x + 5)}{(x - 3)(x + 1)}$

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

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

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

3. Give the horizontal or slant asynptote or give a reason why there is none for each rational function:

(a) $f(x) = \dfrac{(2x-4)(x+5)^3}{(x-3)(x+1)}$

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

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

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

4. The following rational function $y = \dfrac{ax+b}{x+c}$ has a horizontal asymptote at $y = -2$, a zero at $x = 1$, and a vertical asymptote at $x = -3$. What is $a + b + c$?