USE THE FUNCTION

$$f(x) = \frac{2x^2+2x-12}{x^2-9}$$

a) Where does f(x) have vertical asymptotes?

b) Where does f(x) have holes? Use an ordered pair.

c) Where does f(x) have horizontal or oblique asymptotes?

d) Where does f(x) cross its horizontal or oblique asymptote

e) What are the x-intercepts?

f) What are the y-intercepts?

USE THE FUNCTION

$$f(x) = \frac{x^3+x^2-4x-4}{x^2+x-6}$$

a) where does f(x) have vertical asymptotes?

b) Where does F(x) have holes? use an ordered pair

c) Where does f(x) have horizontal or oblique asymptotes?

d) Where does F(x) cross its horizontal or oblique asymptotes?

e) what are the x-intercepts?

f) What are the y-intercepts?

Find the slant asymptote:

1. $F(x) = \dfrac{x^2+1}{x-4}$

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

3. $f(x) = \dfrac{x^3+3x^2-4x-12}{x^2+8x+15}$

Find the horizontal asymptote:

4. $f(x) = \dfrac{7x^2+4x-3}{14x^2+1}$

5. $f(x) = \dfrac{3x^4+8x^3+14x-11}{5x^3-17x^5+24x+1}$

$$f(x) = \frac{2x^2+2x-12}{x^2-9} = \frac{2(x^2+x-6)}{(x+3)(x-3)} = \frac{2(x+3)(x-2)}{(x+3)(x-3)}$$

$$= \frac{2(x-2)}{x-3}$$

a) VA $x=3$

b) $(-3, \frac{5}{3})$

$$f(-3) = \frac{2(-3-2)}{-3-3} = \frac{2(-5)}{-6}$$

$$= \frac{-10}{-6} = \frac{5}{3}$$

c) HA $y=2$

d) $\frac{2(x-2)}{x-3} = \frac{2}{1}$

$2x-6 = 2x-4$

$-6 = -4$

$\emptyset$ doesn't cross

e) $2(x-2) = 0$

$x = 2$

$(2,0)$

f) $\frac{-12}{-9} = \frac{4}{3}$ $(0, \frac{4}{3})$

$$f(x) = \frac{x^3 + x^2 - 4x - 4}{x^2 + x - 6} = \frac{x^2(x+1) - 4(x+1)}{(x+3)(x-2)}$$

$$\frac{(x+2)(x-2)(x+1)}{(x+3)(x-2)} = \frac{(x+2)(x+1)}{x+3}$$

a) VA $x = -3$

b) holes $(2, \frac{12}{5})$

$$f(2) = \frac{(2+2)(2+1)}{2+3} = \frac{(4)(3)}{5} = \frac{12}{5}$$

c) $y = x$

$$x^2 + x - 6 \overline{)\, x^3 + x^2 - 4x - 4}$$

$$x$$

$$-(x^3 + x^2 - 6x)$$

$$2x - 4 \text{ (remainder)}$$

d) $$\frac{(x+2)(x+1)}{x+3} = \frac{x}{1}$$

$$x^2 + 3x = x^2 + 3x + 2$$

$$0 = 2 \quad \text{doesn't cross}$$

e) $(-2, 0)$ $(-1, 0)$

f) $\frac{-4}{-6} = \frac{2}{3}$ $(0, \frac{2}{3})$

Slant

(1)

$$\begin{array}{r} x+4 \\ x-4 \overline{)\,x^2+0x+1} \\ -(x^2-4x) \\ \hline 4x+1 \\ -(4x-16) \\ \hline 17 \end{array}$$

$y = x+4$

(2)

$$\begin{array}{r} -\frac{3}{2}x \\ -2x^2+0x+4 \overline{)\,3x^3+0x^2-2x+0} \\ -(3x^3+0x^2-6x) \\ \hline 4x \end{array}$$

$y = -\frac{3}{2}x$

(3)

$$\begin{array}{r} x-5 \\ x^2+8x+15 \overline{)\,x^3+3x^2-4x-12} \\ -(x^3+8x^2+15x) \\ \hline -5x^2-19x-12 \\ -(-5x^2-40x-75) \\ \hline 21x+63 \end{array}$$

$y = x-5$

HA

(4) $y = \frac{1}{2}$

(5) $y = 0$