

Rational Functions HW 1
Intro to Calculus

Name

Answers

1) All the functions below have the same vertical asymptotes.

Identify the vertical asymptotes $x = \pm 3$

2) Use your knowledge of horizontal asymptotes to match each function with its graph. Remember that horizontal asymptotes tell us about end behavior

let $x = 1,000$ or $x = -1,000$

$$\text{a) } f(x) = \frac{x+1}{x^2-9} \quad \frac{1000+1}{1000000-9} \rightarrow 0$$

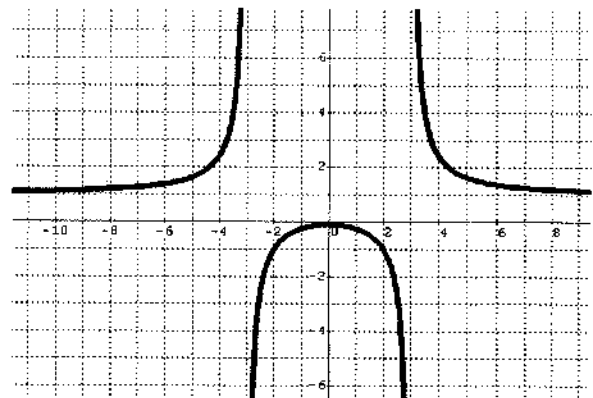
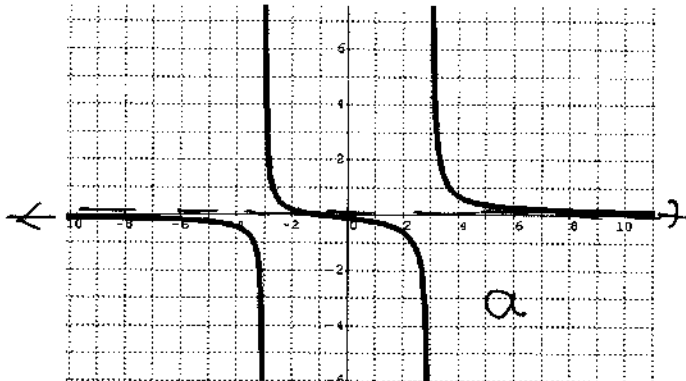
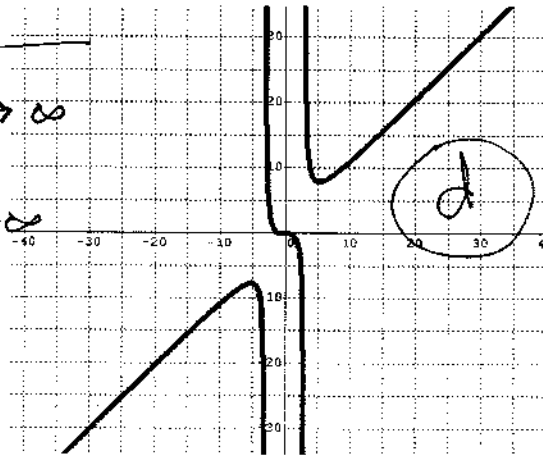
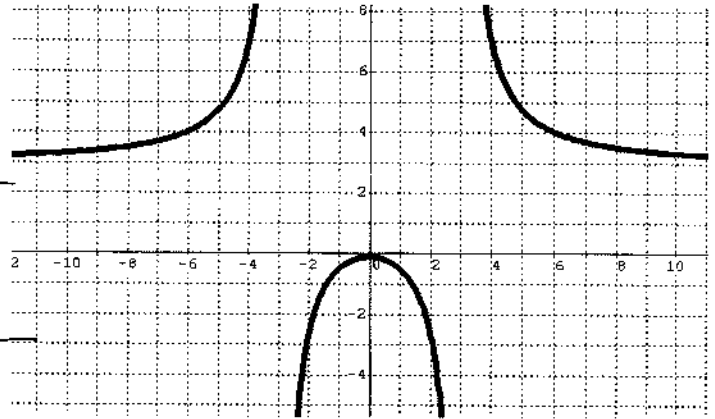
$$\text{or } \frac{-1000+1}{1000000-9} \rightarrow 0$$

$$\text{b) } f(x) = \frac{x^2+1}{x^2-9} \quad \frac{1000000+1}{1000000-9} \rightarrow 1$$

$$\text{c) } f(x) = \frac{3x^2+1}{x^2-9} \quad \frac{3000000+1}{1000000-9} \rightarrow 3$$

$$\text{d) } f(x) = \frac{x^3+1}{x^2-9} \quad \frac{1000000000+1}{1000000-9} \rightarrow \infty$$

$$\frac{-1000000000+1}{-1000000-9} \rightarrow -\infty$$



find x-int:

$$3) f(x) = \frac{3x^2 - 12}{x^2 - 3x} \quad \frac{3(x^2 - 4)}{x(x-3)}$$

$$x^2 - 3x \cdot 0 = \frac{3x^2 - 12}{x^2 - 3x} \cdot x^2 - 3x$$

$$0 = 3x^2 - 12$$

$$0 = 3(x^2 - 4)$$

$$0 = 3(x-2)(x+2)$$

$$x = \pm 2$$

Find the following and sketch a graph of $f(x)$:

y-intercept: none

x-intercept: $x = \pm 2$

$$\frac{3(0)^2 - 12}{0^2 - 3(0)} = \frac{-12}{0}$$

Vertical asymptote(s): $x = 0, x = 3$

Horizontal asymptote(s): $y = 3$

$$\frac{3(1000)^2 - 12}{(1000)^2 - 3(1000)} = \frac{3000000 - 12}{1000000 - 3000}$$

4) Graph the conic section below: $3x^2 - 2y^2 + 30x + 4y + 25 = 0$

$$3x^2 + 30x - 2y^2 + 4y = -25$$

$$3(x^2 + 10x) - 2(y^2 - 2y) = -25$$

$$3(x^2 + 10x + 25) - 2(y^2 - 2y + 1) = -25$$

$$+75 - 2$$

$$3(x+5)^2 - 2(y-1)^2 = 48$$

$$\frac{3(x+5)^2}{48} - \frac{2(y-1)^2}{48} = 1$$

$$\frac{(x+5)^2}{16} - \frac{(y-1)^2}{24} = 1$$

Hyperbola: center $(-5, 1)$

$$a = \pm 4 \quad b = \pm \sqrt{24}$$

