

### 5.5 Practice Problems

1. Analyze the graph of the rational function.  $R(x) = \frac{x-2}{x^2-9} =$

a. Factor the numerator and denominator and find the domain of the function.

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

$$\text{Domain: } \{x \mid x \neq -3, 3\}$$

b. Write the function in lowest term and locate the vertical asymptotes.

The function is  
in lowest terms

$$\text{VA: } x = -3$$

$$x = 3$$

c. Locate the intercepts of the graph.

$$y\text{-int } x=0$$

$$R(0) = \frac{0-2}{0^2-9} = \frac{-2}{-9} = \frac{2}{9} \quad (0, \frac{2}{9})$$

$$x\text{-int: Set num} = 0$$

$$x-2=0 \quad x=2 \quad (2, 0)$$

$$+2 \quad +2$$

d. Locate the horizontal or oblique asymptotes. Determine points, if any at which the graph intersects this asymptote.

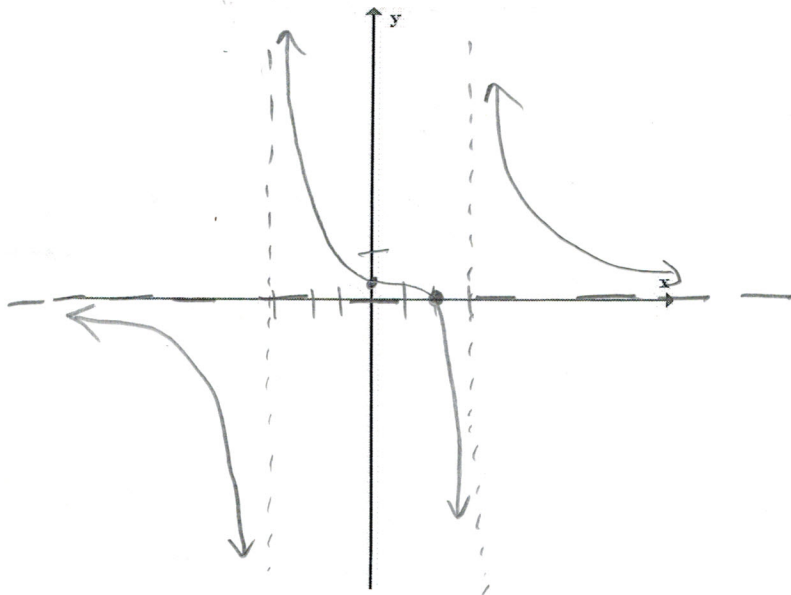
$$n = \text{degree of num} = 1$$

$$m = \text{degree of denom} = 2$$

$n < m$  there is a HA:  $y = 0$

e. Use a graphing utility to confirm your results and to approximate any turning points.

f. Sketch a graph using the information you have gathered.



2. Analyze the graph of the rational function.  $R(x) = \frac{2x^2 + 4x}{x^2 + x - 6}$

a. Factor the numerator and denominator and find the domain of the function.

$$R(x) = \frac{2x(x+4)}{(x-2)(x+3)}$$

$$\text{Domain: } \{x \mid x \neq 2, -3\}$$

b. Write the function in lowest term and locate the vertical asymptotes.

The function is in lowest terms

$$\text{VA: } x = 2 \\ x = -3$$

c. Locate the intercepts of the graph.

y-int  $x = 0$

$$R(0) = \frac{2(0)^2 + 4(0)}{0^2 + 0 - 6} = \frac{0}{-6} = 0 \quad (0,0)$$

x-int set num = 0  $(0,0)$   $(-2,0)$

$$2x^2 + 4x = 0 \quad 2x(x+2) = 0 \\ x = 0 \quad x = -2$$

d. Locate the horizontal or oblique asymptotes. Determine points, if any at which the graph intersects this asymptote.

$$n = \text{degree of num} = 2 \\ m = \text{degree of denom} = 2$$

$$\text{there is a HA } y = \frac{2}{1} = 2$$

e. Use a graphing utility to confirm your results and to approximate any turning points.

$$\frac{2x^2 + 4x}{x^2 + x - 6} = 2$$

$$2x^2 + 4x = 2(x^2 + x - 6) \\ 2x^2 + 4x = 2x^2 + 2x - 12 \\ -2x \quad -2x$$

$$2x = -12 \\ \frac{2x}{2} = \frac{-12}{2} \\ x = -6$$

f. Sketch a graph using the information you have gathered.

