

### Sections 2.6 & 2.7 – I.C.E #3

Part A: For #1 – 4, be sure to use a sign chart to find the appropriate intervals for your solution set:

1) Solve  $x^2 + 5x < 36$  and answer using interval notation

$$x^2 + 5x - 36 < 0$$

$$(x+9)(x-4) < 0$$



$$(-9, 4)$$

2) Solve  $\frac{5(x-5)}{x+5} \geq 0$  and answer using interval notation



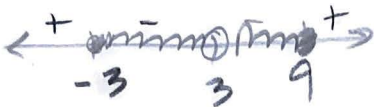
not in  
Domain!

$$(-\infty, -5) \cup [5, \infty)$$

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3) Solve  $\frac{x^2-6x-27}{x^2-6x+9} \leq 0$  and answer using interval notation

$$\frac{(x-9)(x+3)}{(x-3)(x-3)} \leq 0$$



$$[-3, 3) \cup (3, 9]$$

4) Solve  $\frac{6}{x-4} - \frac{2}{x+4} > 0$  and answer using interval notation

$$\frac{6x+24-2x+8}{(x-4)(x+4)} = \frac{4x+32}{(x-4)(x+4)} = \frac{4(x+8)}{(x-4)(x+4)} > 0$$



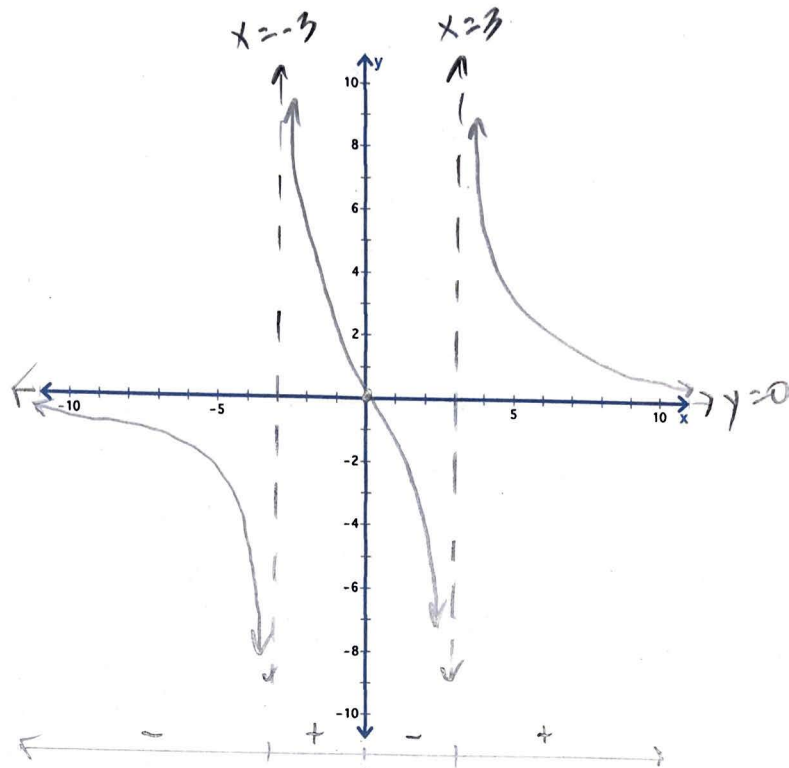
$$(-8, -4) \cup (4, \infty)$$

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Part B: Find all horizontal, slant, and vertical asymptotes for each function. Be sure to state your answers as equations of lines. Also find all x and y-intercepts and draw a sketch of the graph. Label where the asymptotes and the intercepts are located on your graph.

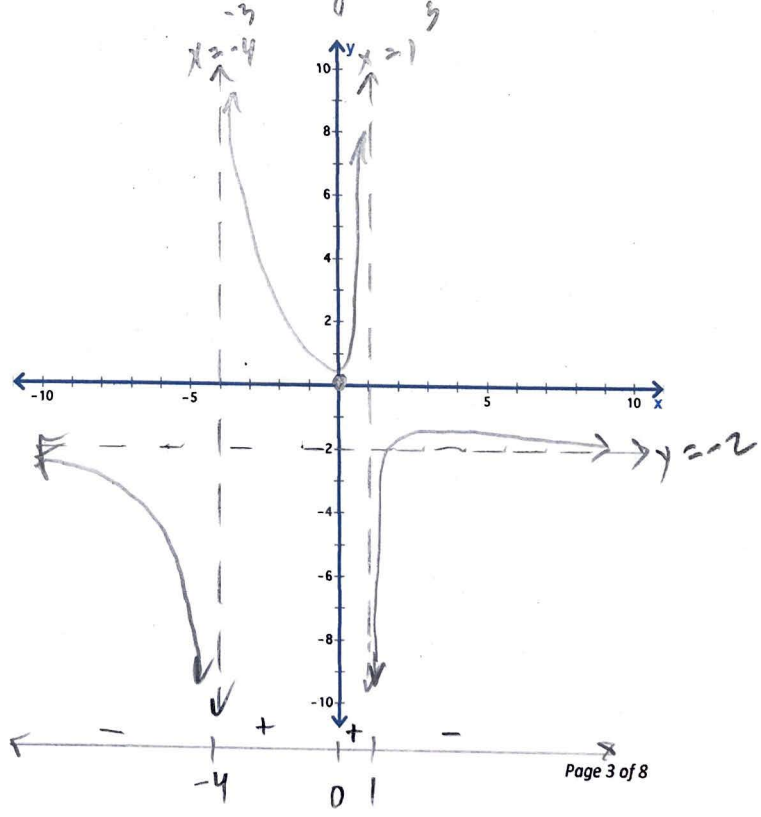
1)  $f(x) = \frac{2x}{x^2 - 9} = \frac{2x}{(x-3)(x+3)}$

Hole?           No            
 VA:            $x = -3, x = 3$             
 HA or SA:            $y = 0$             
 x-int:            $(0, 0)$             
 y-int:            $(0, 0)$           



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

Hole?           No            
 VA:            $x = -4, x = 1$             
 HA or SA:            $y = -2$             
 x-int:            $(0, 0)$             
 y-int:            $(0, 0)$           



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$$3) f(x) = \frac{x^2 - 6x + 5}{x^2 - 9x + 20} = \frac{(x-5)(x-1)}{(x-5)(x-4)}$$

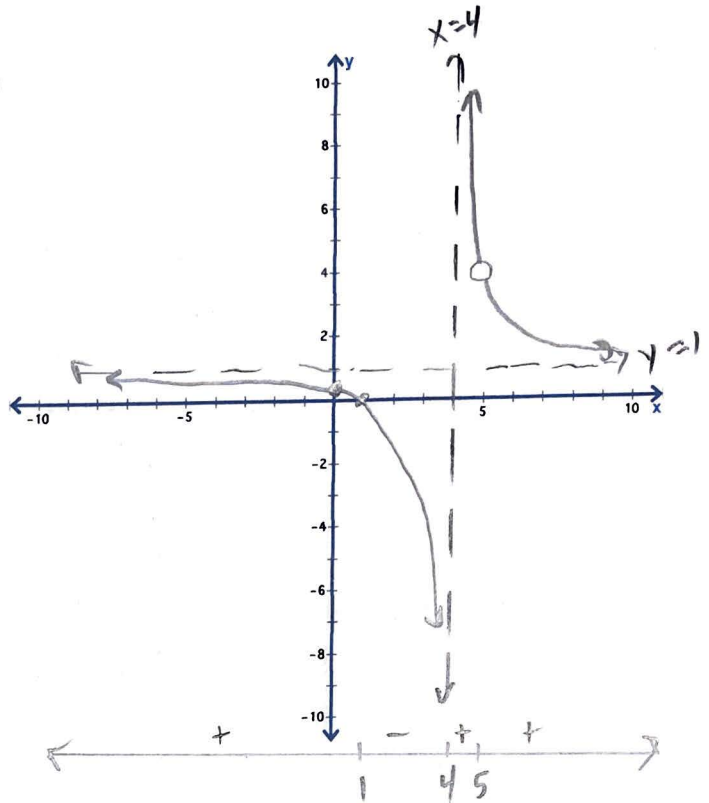
Hole? (5, 4)

VA:  $x=4$

HA or SA:  $y=1$

x-int: (1, 0)

y-int: (0,  $\frac{1}{4}$ )



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

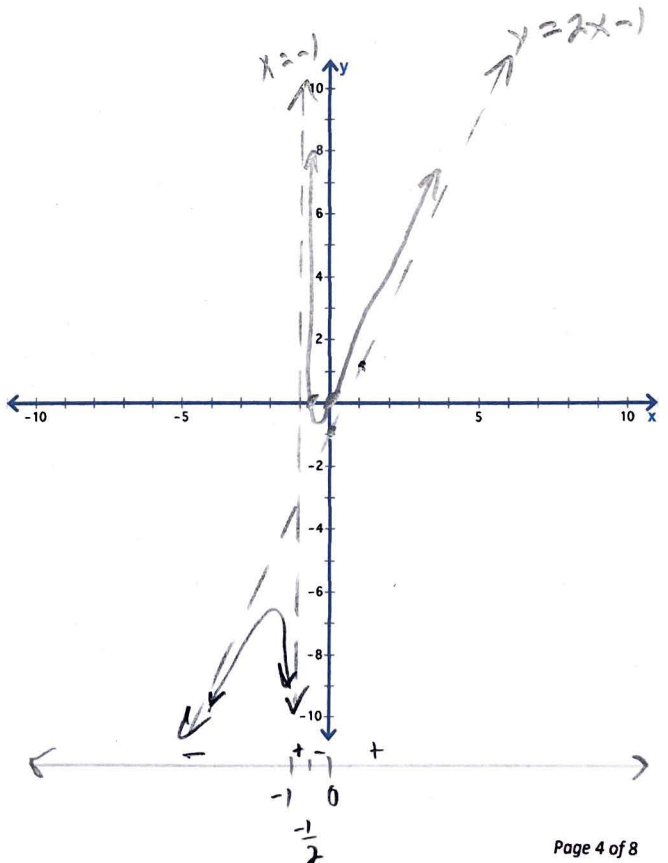
Hole? No

VA:  $x=-1$

HA or SA:  $y=2x-1$

x-int: (0, 0) (- $\frac{1}{2}$ , 0)

y-int: (0, 0)



$$\begin{array}{r} 2x-1 \\ x+1 \overline{) 2x^2 + x + 0} \\ \underline{-(2x^2 + 2x)} \\ -x \end{array}$$

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5)  $h(x) = \frac{x-6}{x^3-27} = \frac{x-6}{(x-3)(x^2+3x+9)}$

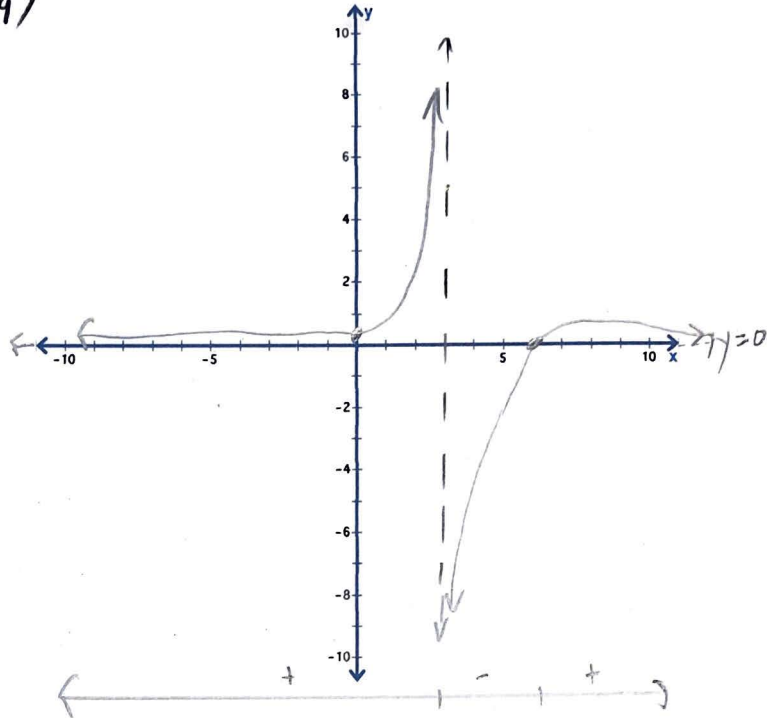
Hole? NO

VA:  $x=3$

HA or SA:  $y=0$

x-int:  $(6, 0)$

y-int:  $(0, \frac{2}{9})$



6)  $k(x) = \frac{3x^2}{3x^2-9} = \frac{3x^2}{3(x^2-3)}$

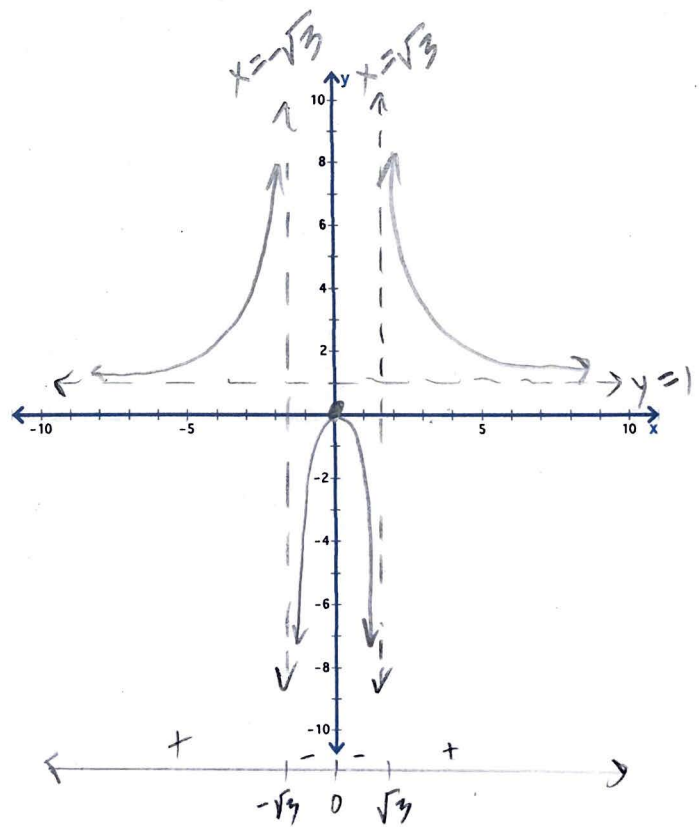
Hole? NO

VA:  $x = -\sqrt{3}, x = \sqrt{3}$

HA or SA:  $y=1$

x-int:  $(0, 0)$

y-int:  $(0, 0)$



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$$\begin{array}{r} -4 \overline{) 1815} \\ \underline{-4} \phantom{15} \\ 4 \phantom{15} \\ \underline{-4} \phantom{15} \\ 15 \\ \underline{-16} \\ -1 \end{array}$$

7)  $h(x) = \frac{x^2 + 8x + 15}{x + 4} = \frac{(x+3)(x+5)}{(x+4)}$

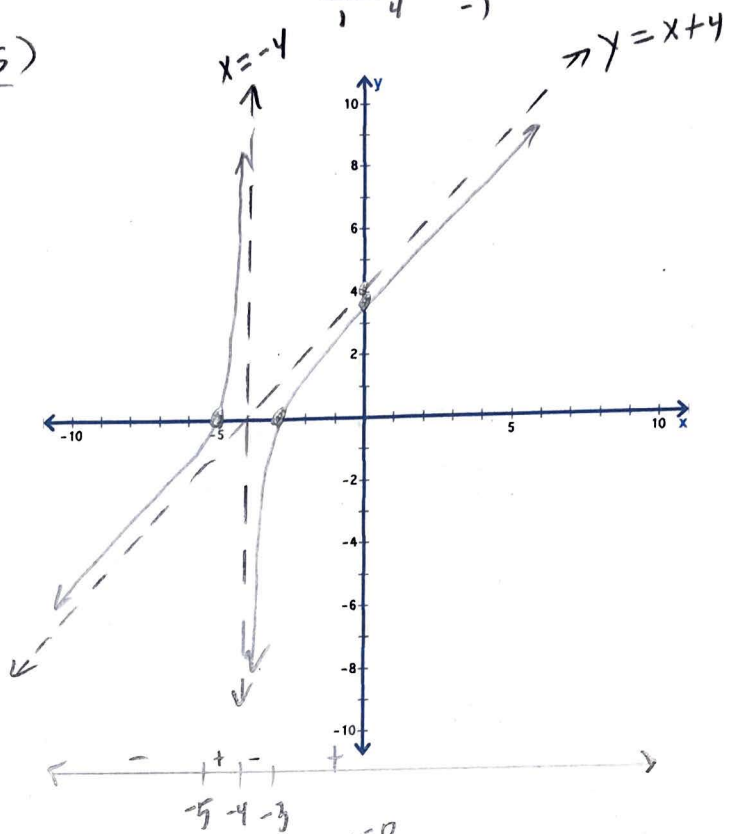
Hole? NO

VA:  $x = -4$

HA or SA:  $x + 4$

x-int:  $(-3, 0), (-5, 0)$

y-int:  $(0, \frac{15}{4})$



8)  $q(x) = \frac{4}{x^2 + 4x} = \frac{4}{x(x+4)}$

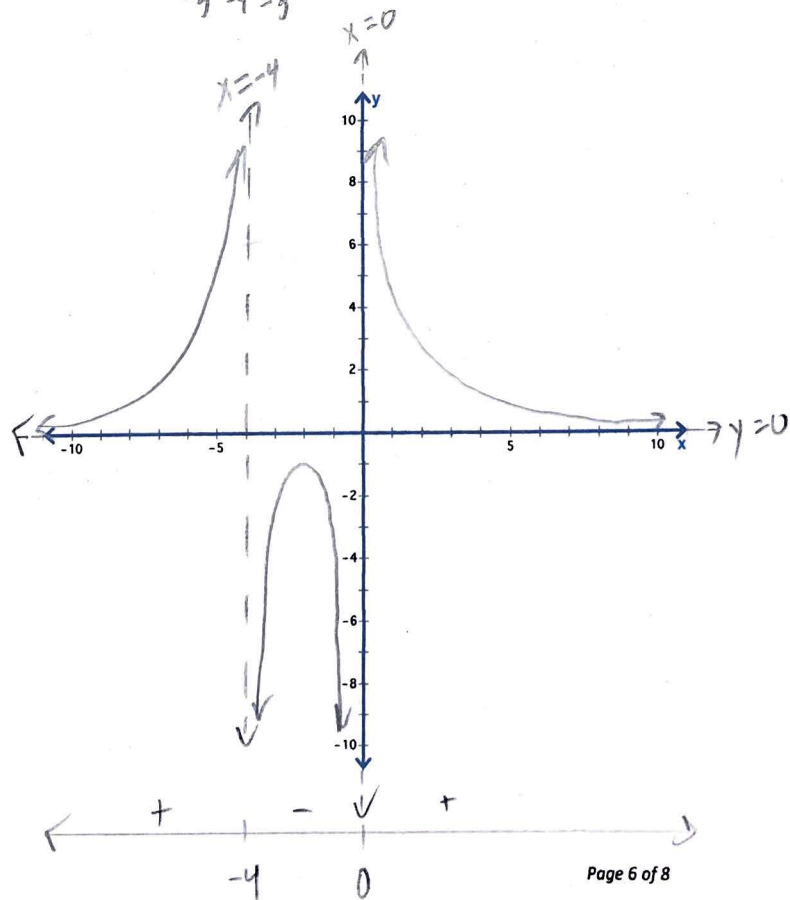
Hole? NO

VA:  $x = 0, x = -4$

HA or SA:  $y = 0$

x-int: None

y-int: None



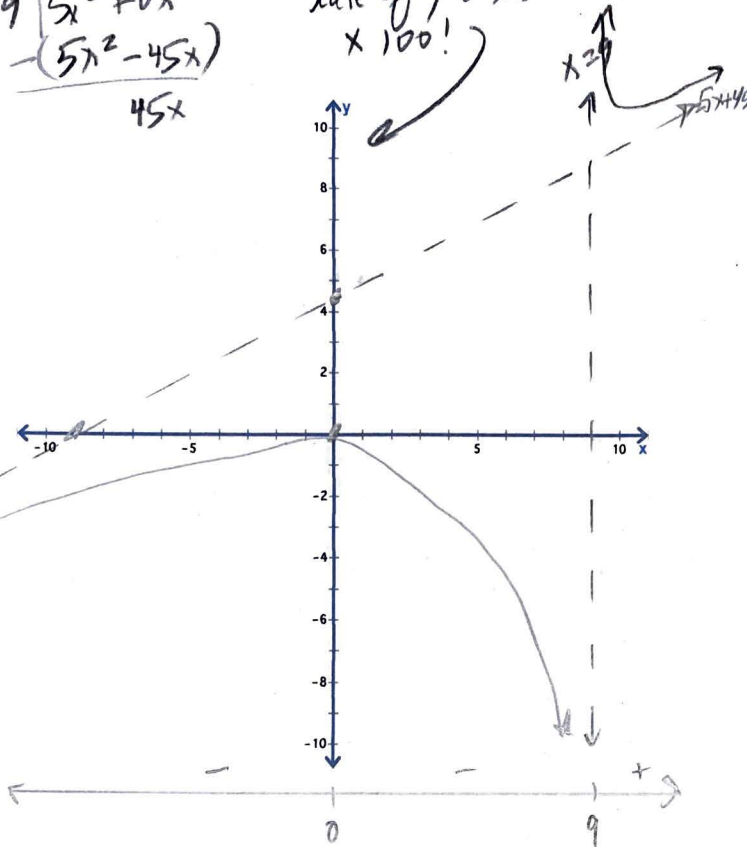
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9)  $g(x) = \frac{5x^2}{x-9}$

$$x-9 \overline{) \begin{array}{r} 5x+45 \\ 5x^2+0x \\ -(5x^2-45x) \\ \hline 45x \end{array}}$$

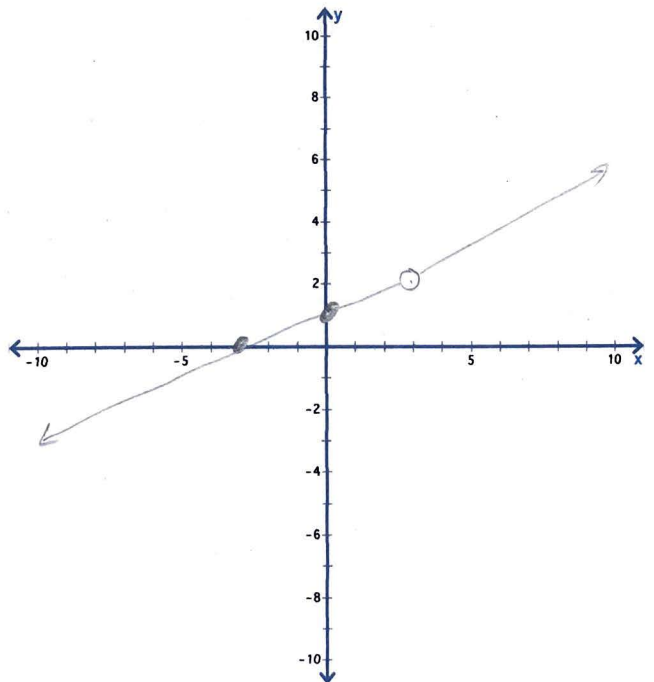
scale of y-axis  
x 100!

Hole? no  
 VA:  $x=9$   
 HA or SA:  $5x+45$   
 x-int:  $(0,0)$   
 y-int:  $(0,0)$



10)  $g(x) = \frac{x^2-9}{3x-9} = \frac{(x+3)(x-3)}{3(x-3)}$

Hole?  $(3, 2)$   
 VA: none  
 HA or SA:  $y = \frac{1}{3}x + 1$   
 x-int:  $(-3, 0)$   
 y-int:  $(0, 1)$



$$\frac{1}{3}x + 1$$

$$3x-9 \overline{) \begin{array}{r} x^2+0x-9 \\ -(x^2-3x) \\ \hline 3x-9 \\ 3x-9 \\ \hline 0 \end{array}}$$

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$$11) f(x) = \frac{x+2}{2x-2} = \frac{x+2}{2(x-1)}$$

Hole?       No      

VA:        $x=1$       

HA or SA:        $y = \frac{1}{2}$       

x-int:        $(-2, 0)$       

y-int:        $(0, -1)$       

