

Section 3.7 – Practice Problems

Find the x and y intercepts of the following rational functions

1. $y = \frac{x+4}{x-1}$ $f(0) = -4$

$0 = \frac{x+4}{x-1}$
 $x = -4$

$x\text{-int: } (-4, 0)$
 $y\text{-int: } (0, -4)$

2. $y = \frac{x}{x+3}$ $f(0) = 0$

$0 = \frac{x}{x+3} = 0$

$x\text{-int: } (0, 0)$
 $y\text{-int: } (0, 0)$

3. $y = \frac{(x-1)(x+4)}{(x+2)(x-2)}$

$f(0) = \frac{-4}{-4} = 1$

$0 = (x-1)(x+4)$ $x = 1, -4$

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

4. $y = \frac{3}{x+2}$ $f(0) = \frac{3}{2}$

$0 = 3$

$x\text{-int: } (\text{None})$
 $y\text{-int: } (0, \frac{3}{2})$

5. $y = \frac{1}{x^2+1}$ $f(0) = \frac{1}{1} = 1$

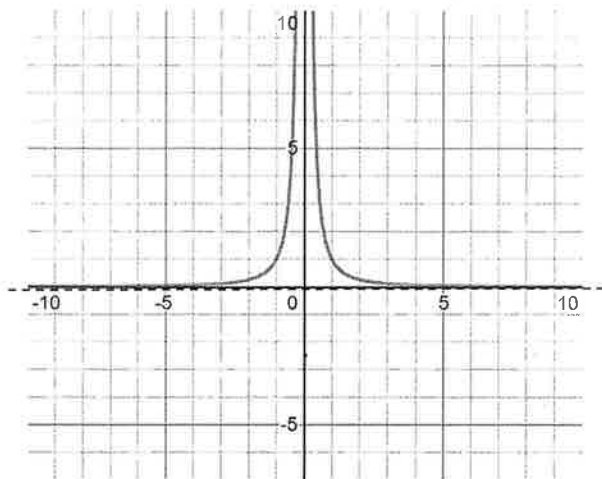
$x\text{-int: } (\text{None})$
 $y\text{-int: } (0, 1)$

6. $y = \frac{1}{x^2-4}$ $f(0) = \frac{1}{-4}$

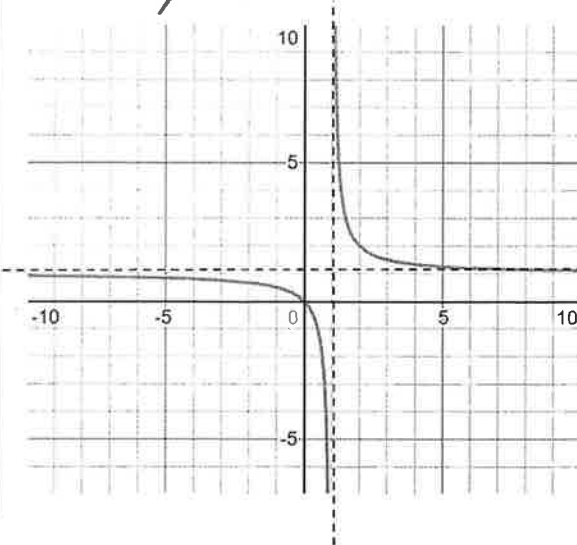
$x\text{-int: } (\text{None})$
 $y\text{-int: } (0, -\frac{1}{4})$

Determine the Domain and Range of the following graphs

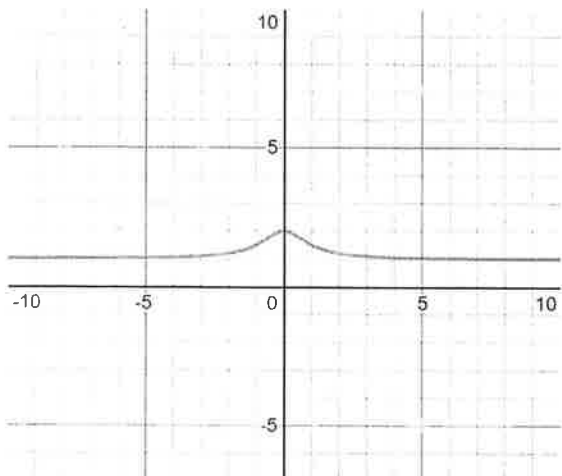
7. Domain: $x \neq 0$
 Range: $y > 0$



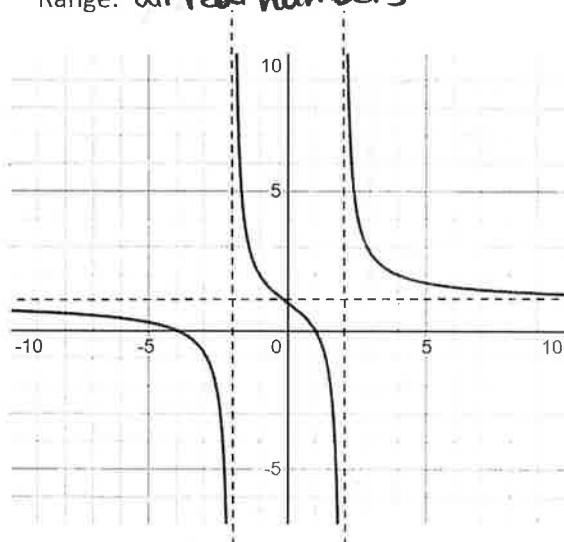
8. Domain: $x \neq 1$
 Range: $y \neq 1$



9. Domain: \mathbb{R} all real numbers
 Range: $1 < y \leq 2$



10. Domain: $x \neq -2, 2$
 Range: all real numbers



Find all the Vertical and Horizontal Asymptotes

11. $f(x) = \frac{2}{x+3}$

VA: $x = -3$
 HA: $y = 0$

12. $g(x) = \frac{x+4}{x+2}$

VA: $x = -2$
 HA: $y = 1$

13. $h(x) = \frac{2}{x} - 2 \rightarrow \frac{2-2x}{x}$

VA: $x = 0$
 HA: $y = -2$

14. $t(x) = \frac{1}{x+2} - 1 \rightarrow \frac{1-(x+2)}{x+2}$

VA: $x = -2$
 HA: -1

$$15. j(x) = \frac{2x^2 - 2}{x^2 - 4} \rightarrow \frac{2x^2 - 2}{(x-2)(x+2)}$$

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

$$\text{HA: } y = 2$$

$$16. k(x) = \frac{3x + 4}{2x - 5}$$

$$\text{VA: } x = \frac{5}{2}$$

$$\text{HA: } y = \frac{3}{2}$$

$$17. l(x) = \frac{x-1}{x^2-1} \rightarrow \frac{(x-1)}{(x+1)(x-1)}$$

$$\text{VA: } x = 1, -1$$

$$\text{NA: } y = 0$$

$$18. m(x) = \frac{-3x^2 - 3x + 6}{x^2 - 9}$$

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

$$\text{HA: } y = -3$$

$$19. n(x) = \frac{x^2 - 3x - 4}{x^2 + x - 6} \rightarrow \frac{(x-4)(x+1)}{(x+3)(x-2)}$$

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

$$\text{NA: } y = 1$$

$$20. r(x) = \frac{1}{(x-1)^2}$$

$$\text{VA: } x = 1$$

$$\text{NA: } y = 0$$

$$21. p(x) = \frac{x^2 - 4}{x^2 + 2x - 3} \rightarrow \frac{(x+2)(x-2)}{(x+3)(x-1)}$$

$$x = -3, 1$$

$$y = 1$$

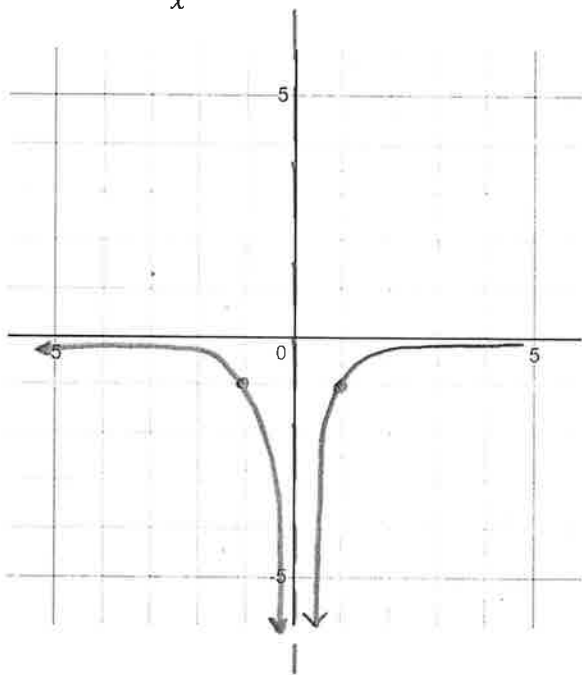
$$22. q(x) = \frac{x^2 - 4x + 3}{2x^2 - 8x} \rightarrow \frac{(x-3)(x-1)}{2x(x-4)}$$

$$\text{VA: } x = 0 \quad x = 4$$

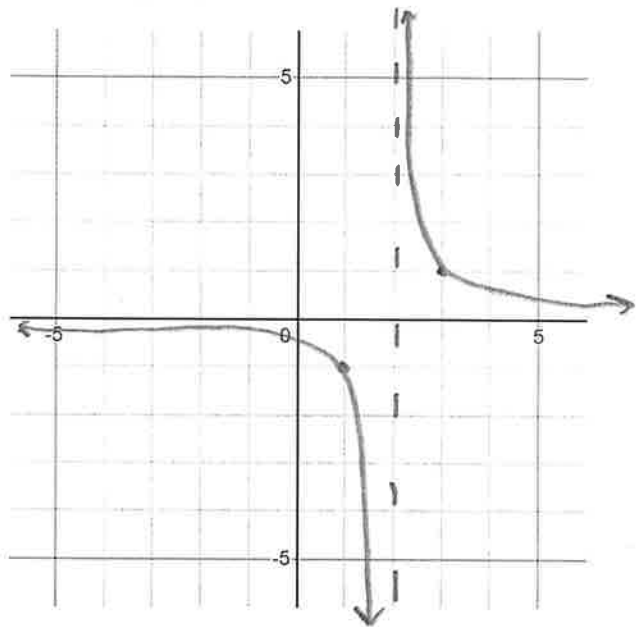
$$\text{NA: } y = 1$$

Sketch the graph of the following functions. Label the asymptotes.

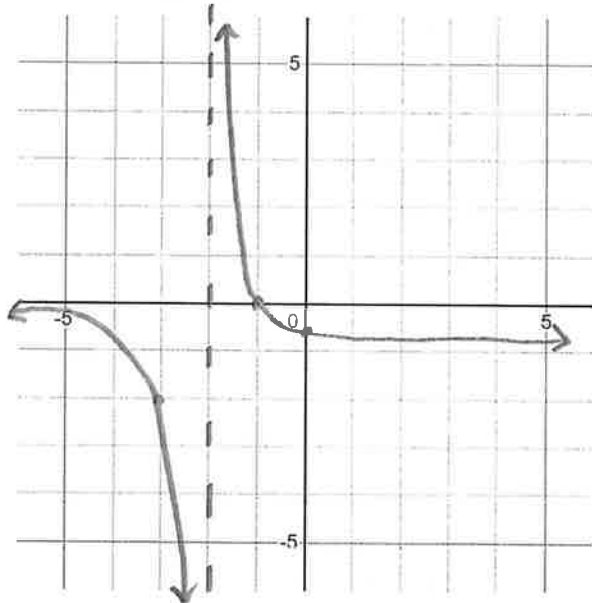
23. $p(x) = -\frac{1}{x^2}$



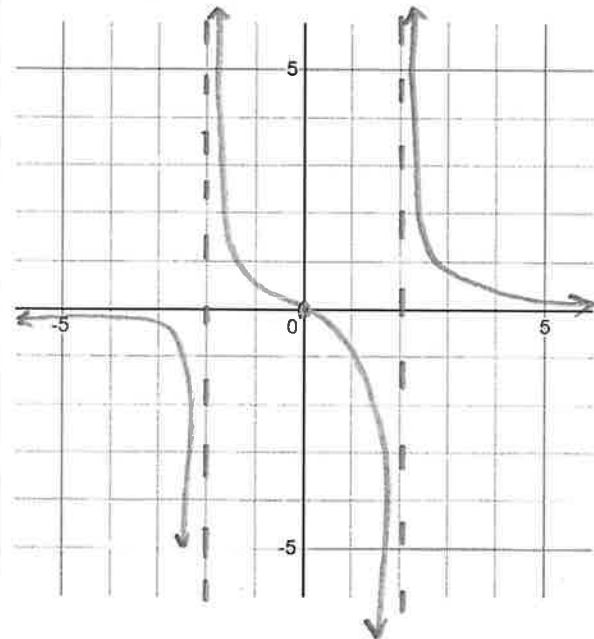
24. $f(x) = \frac{1}{x-2}$



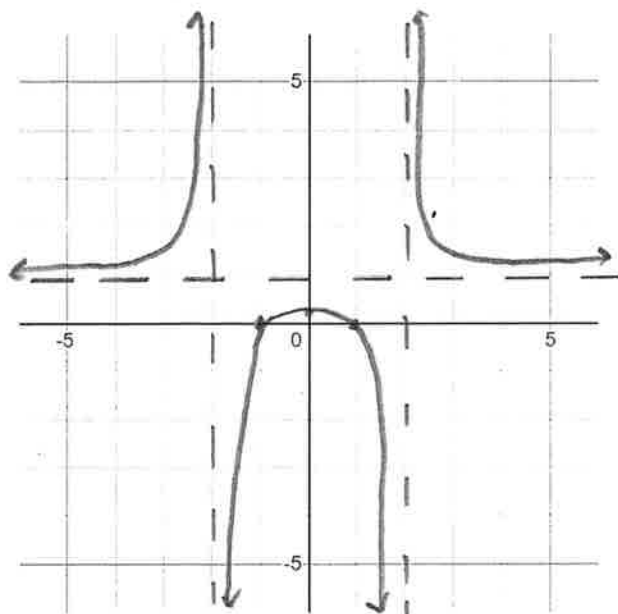
25. $g(x) = \frac{1}{x+2} - 1$



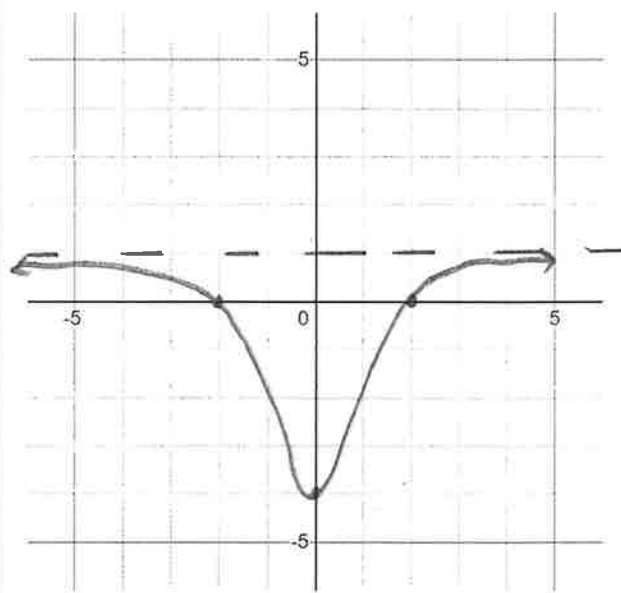
26. $k(x) = \frac{x}{x^2 - 4}$



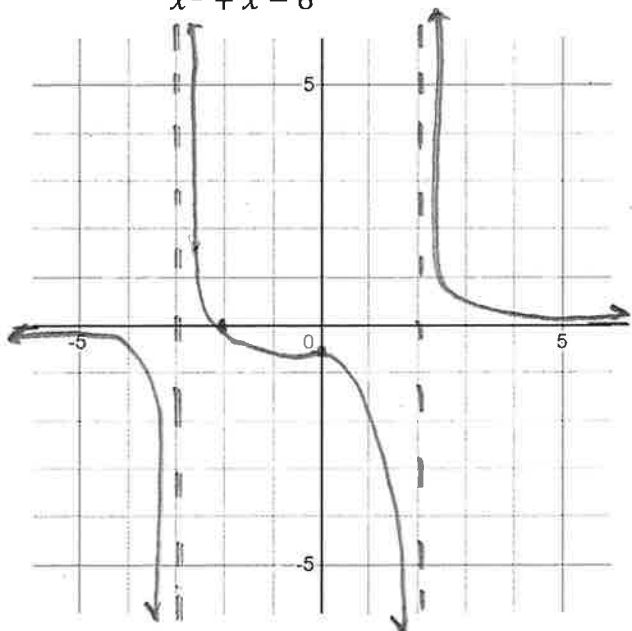
27. $m(x) = \frac{x^2 - 1}{x^2 - 4}$



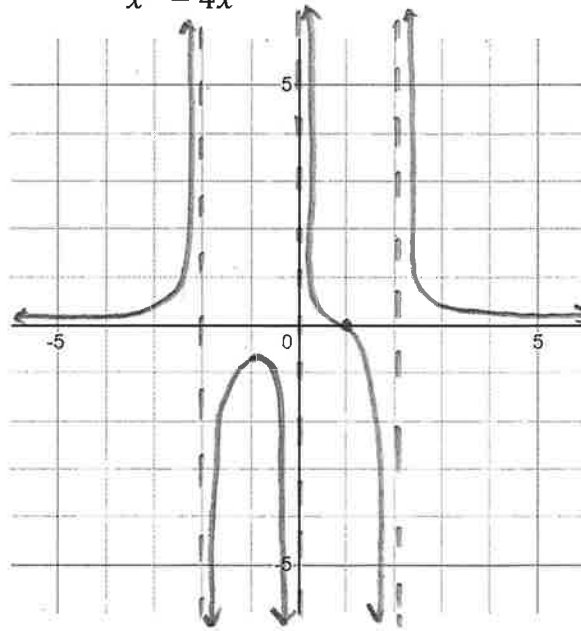
28. $j(x) = \frac{x^2 - 4}{x^2 + 1}$



29. $s(x) = \frac{x + 2}{x^2 + x - 6}$



30. $t(x) = \frac{x - 1}{x^3 - 4x}$



Answer Key – Section 2.3

1. $(-4, 0), (0, -4)$
2. $(0, 0)$
3. $(-4, 0), (1, 0), (0, 1)$
4. $(0, \frac{3}{2}), \text{No } x - \text{int}$
5. $(0, 1), \text{No } x - \text{int}$
6. $(0, -\frac{1}{4}), \text{No } x - \text{int}$
7. $D: x \neq 0$ $R: y \geq 0$
8. $D: x \neq 1$ $R: y \neq 1$
9. $D: \text{All Real Numbers}$ $R: 1 < y \leq 2$
10. $D: x \neq 2, -2$ $R: \text{All Real Numbers}$
11. $x = -3, y = 0$
12. $x = -2, y = 1$
13. $x = 0, y = -2$
14. $x = -2, y = -1$

15. $x = -2, 2, y = 2$
16. $x = \frac{5}{2}, y = \frac{3}{2}$
17. $x = -1, 1, y = 0$
18. $x = -3, 3, y = -3$
19. $x = -3, 2, y = 1$
20. $x = 1, y = 0$
21. $x = -3, 1, y = 1$
22. $x = 0, 4, y = \frac{1}{2}$
23. <i>See Website</i>
24. <i>See Website</i>
25. <i>See Website</i>
26. <i>See Website</i>
27. <i>See Website</i>
28. <i>See Website</i>
29. <i>See Website</i>
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