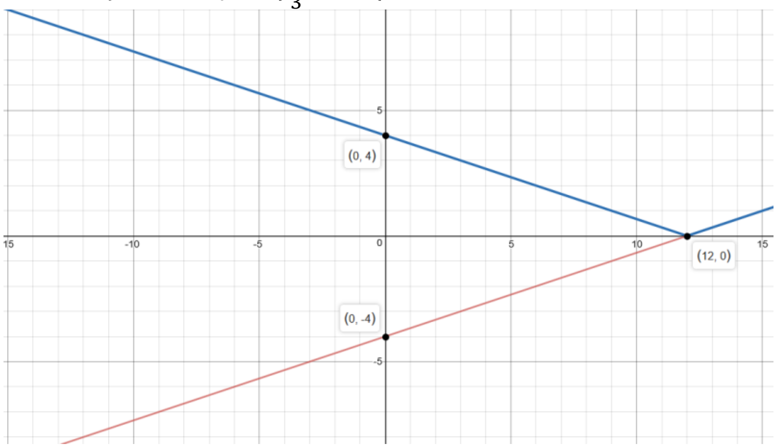
Name: ____________________ Date: __________ Block: __________

Chapter 8 Review
ANSWER KEY

1. $f(x)$: $y = \frac{1}{3}x - 4$

$|f(x)|$: $y = |\frac{1}{3}x - 4|$



$f(x)$: **Domain:** $x \in R$

Range: $y \in R$

$|f(x)|$: **Domain:** $x \in R$

Range: $y \geq 0$, $y \in R$

y-intercept: (0 , 4)

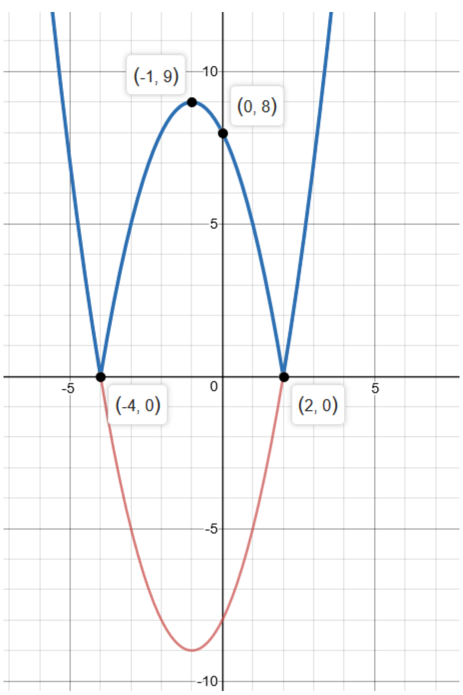
critical point(s): (12 , 0)

Piecewise notation:

$$y = \begin{cases} \frac{1}{3}x - 4, \text{ if } x \geq 12 \\ -\frac{1}{3}x + 4, \text{ if } x < 12 \end{cases}$$

2. $f(x)$: $y = x^2 + 2x - 8$

$|f(x)|$: $y = |x^2 + 2x - 8|$



$f(x)$: **Domain:** $x \in R$

Range: $y \geq -9$, $y \in R$

$|f(x)|$: **Domain:** $x \in R$

Range: $y \geq 0$, $y \in R$

y-intercept: (0 , -8)

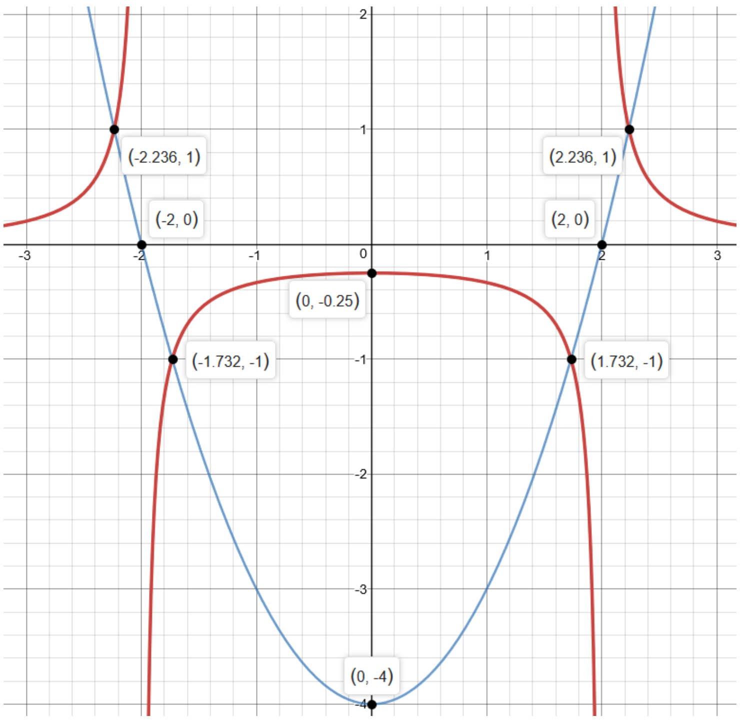
critical point(s): (-4 , 0) and (2 , 0)

Piecewise Notation

$$y = \begin{cases} x^2 + 2x - 8, & \text{if } x \leq -4 \text{ or } x \geq 2 \\ -x^2 - 2x + 8, & \text{if } -4 < x < 2 \end{cases}$$

3. $f(x)$: $y = x^2 - 4$

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



$f(x)$: **Domain: $x \in R$**

Range: $y \geq -4$, $y \in R$

$\frac{1}{f(x)}$: **Domain: $x \neq 2$, $x \neq -2$, $x \in R$**

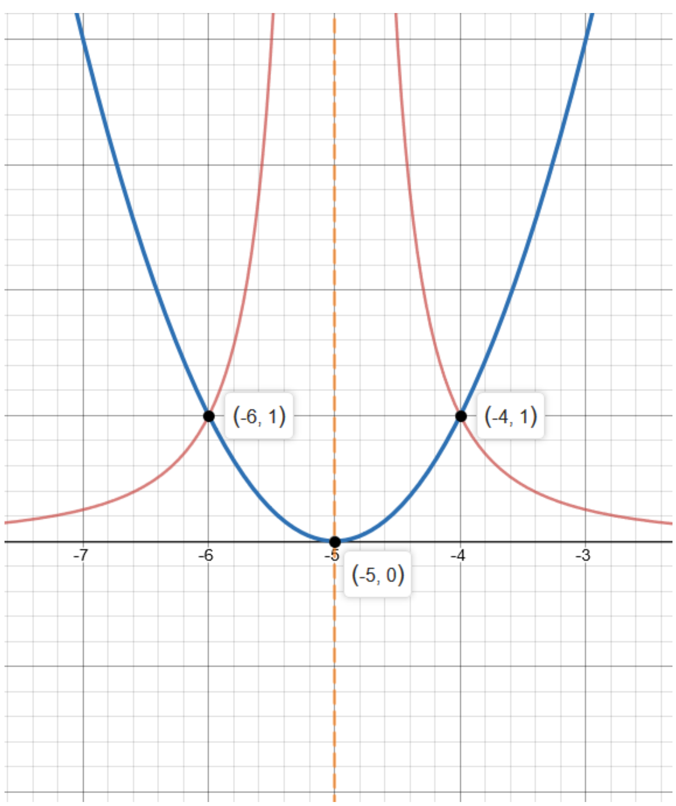
Range: $y > 0$, $y < -\frac{1}{4}$, $y \in R$

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

critical point(s): (-2 , 0) and (2 , 0)

4. $f(x)$: $y = x^2 + 10x + 25$

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



$f(x)$: **Domain: $x \in R$**

Range: $y \geq 0$, $y \in R$

$\frac{1}{f(x)}$: **Domain: $x \neq -5$, $x \in R$**

Range: $y > 0$, $y \in R$

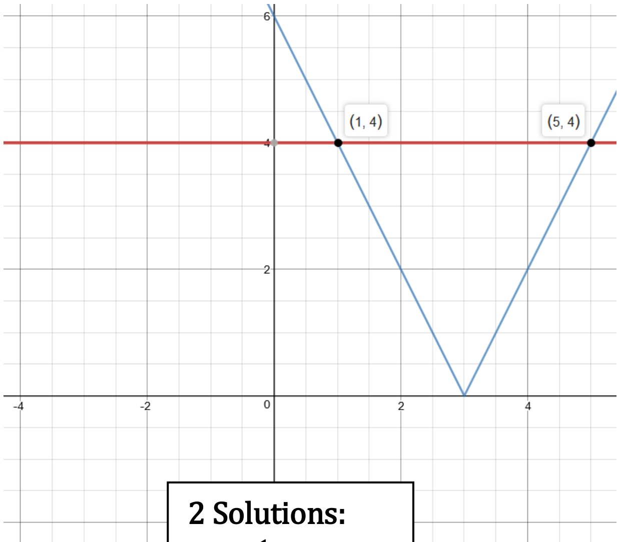
F(x): **y-intercept: (0 , 25)**

$\frac{1}{f(x)}$ **y-intercept: $(0 , \frac{1}{25})$**

F(x): **critical point(s): (-5 , 0)**

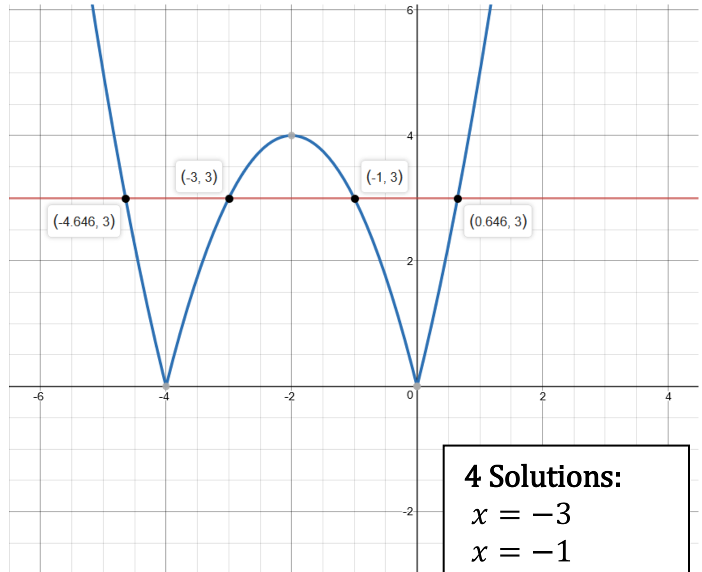
For questions 5-6, solve by graphing.

5. $4 = |-2x + 6|$



2 Solutions:
$x = 1$
$x = 5$

6. $3 = |x^2 + 4x|$



4 Solutions:
$x = -3$
$x = -1$
$x = -2 - \sqrt{7}$
$x = -2 + \sqrt{7}$

For questions 7-10, solve algebraically.

7. $6x = |x^2 + 9|$

$6x = x^2 + 9$
$x^2 - 6x + 9 = 0$
$(x - 3)^2 = 0$
$x = 3$

Check: $(x = 3)$
$6(3) = |(3)^2 + 9|$
$18 = |18|$
$18 = 18$ ✓ True

$6x = -x^2 - 9$
$x^2 + 6x + 9 = 0$
$(x + 3)^2 = 0$
$x = -3$

Check: $(x = -3)$
$6(-3) = |(-3)^2 + 9|$
$-18 = |18|$
$18 = 18$ × False

$\therefore$ $x = 3$ is a solution
$x = -3$ is an extraneous root

8. $24 = |x^2 - 10x|$

$24 = x^2 - 10x$
$x^2 - 10x - 24 = 0$
$(x - 12)(x + 2) = 0$
$x = 12 \quad x = -2$

Check: $(x = 12)$
$24 = |(12)^2 - 10(12)|$
$24 = 24$ ✓ True

Check: $(x = -2)$
$24 = |(-2)^2 - 10(-2)|$
$24 = 24$ ✓ True

$24 = -x^2 + 10x$
$x^2 - 10x + 24 = 0$
$(x - 4)(x - 6) = 0$
$x = 4 \quad x = 6$

Check: $(x = 4)$
$24 = |(4)^2 - 10(4)|$
$24 = 24$ ✓ True

Check: $(x = 6)$
$24 = |(6)^2 - 10(6)|$
$24 = 24$ ✓ True

$\therefore x = 12, -2, 4, and\ 6$ are solutions

9. $|2x - 4| = 7$

$2x - 4 = 7$
$2x = 11$
$x = \frac{11}{2}$

Check: $(x = \frac{11}{2})$
$\left|2\left(\frac{11}{2}\right) - 4\right| = 7$
$|7| = 7$
$7 = 7$ ✓ True

$-2x + 4 = 7$
$-2x = 3$
$x = \frac{-3}{2}$

Check: $(x = \frac{-3}{2})$
$\left|2\left(\frac{-3}{2}\right) - 4\right| = 7$
$|-7| = 7$
$7 = 7$ ✓ True

$\therefore x = \frac{11}{2}$ and $x = -\frac{3}{2}$ are solutions

10. $|5 - 3x| + 12 = 31$
$|5 - 3x| = 19$

$5 - 3x = 19$
$-3x = 14$
$x = \frac{-14}{3}$

Check: $(x = \frac{-14}{3})$
$\left|5 - 3\left(\frac{-14}{3}\right)\right| = 19$
$|19| = 19$
$19 = 19$ ✓ True

$-5 + 3x = 19$
$3x = 24$
$x = 8$

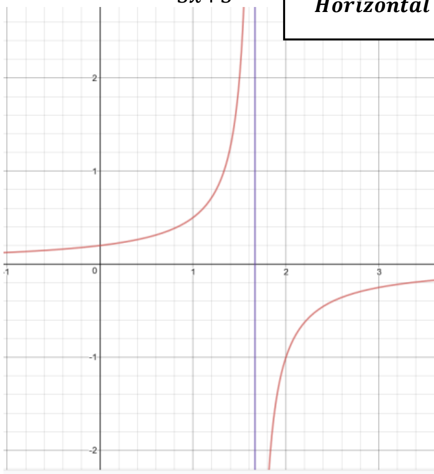
Check: $(x = 8)$
$|5 - 3(8)| = 19$
$|-19| = 19$
$19 = 19$ ✓ True

$\therefore x = \frac{-14}{3}$ and $x = 8$ are solutions

For questions 11-12, identify the equation of the vertical and horizontal asymptotes of each function. Then graph the function.

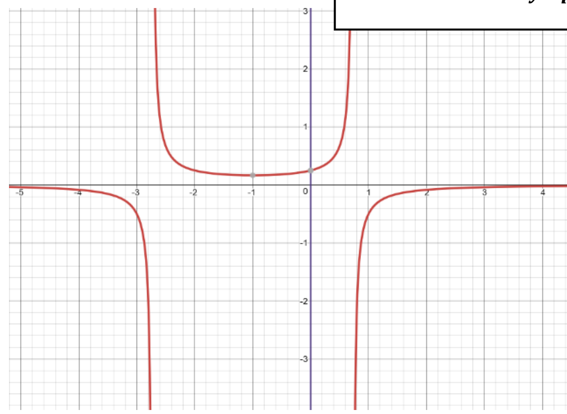
11. $y = \frac{1}{-3x+5}$

Vertical Asymptote: $x = \frac{5}{3}$
Horizontal Asymptote: $y = 0$



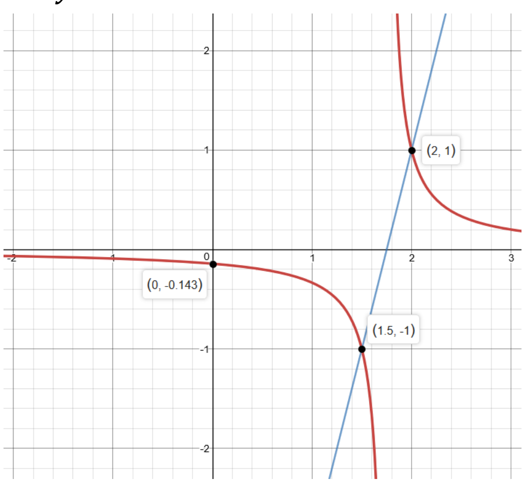
12. $y = \frac{1}{-2(x+1)^2+6}$

Vertical Asymptotes:
$x = -1 + \sqrt{3}$
$x = -1 - \sqrt{3}$
Horizontal Asymptote: $y = 0$

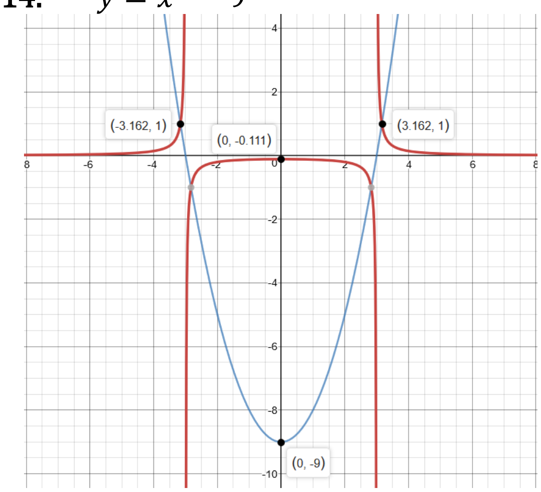


For questions 13-14, graph the linear function first. Then use the linear function to graph the reciprocal function.

13. $y = 4x - 7$

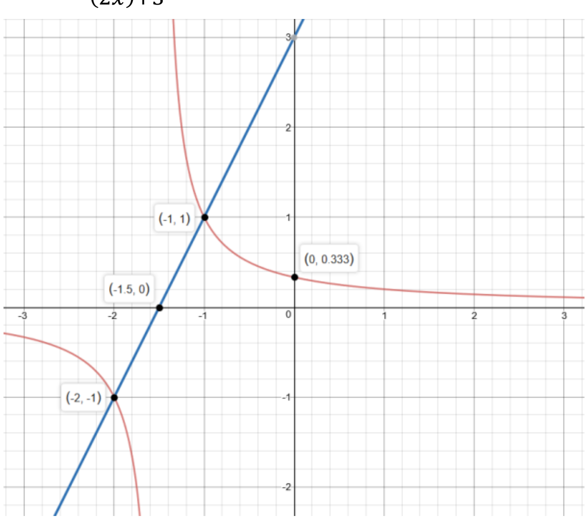


14. $y = x^2 - 9$

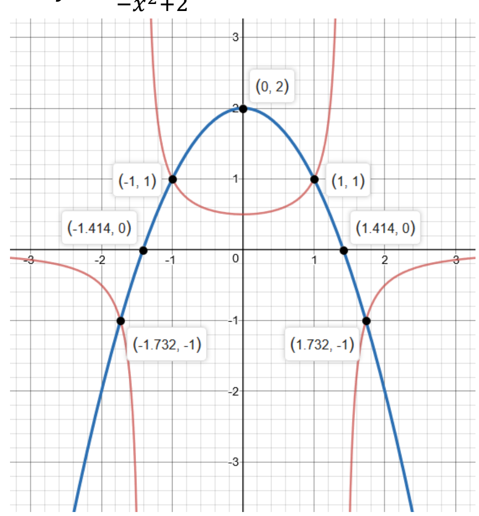


For questions 15-16, graph the reciprocal function first. Then use the graph of the reciprocal function to graph the linear function.

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



16. $y = \frac{1}{-x^2+2}$



17. For which values of q does the graph of $y = \frac{1}{-(x-3)^2+q}$ have:

a. one vertical asymptote

$q = 0$

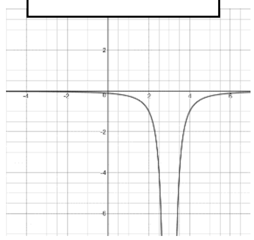
b. two vertical asymptotes

$q > 0$

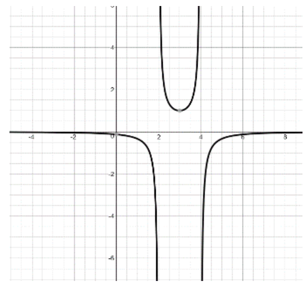
c. no vertical asymptotes

$q < 0$

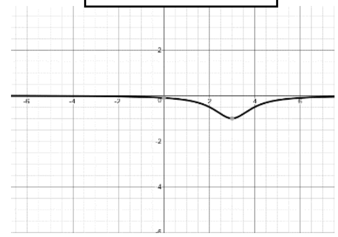
$q = 0$



$q > 0$

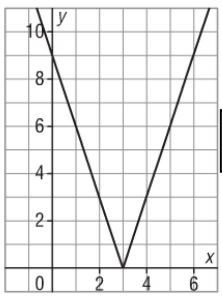


$q < 0$



18. Which function describes these graphs? **Show full workings in your answer!**

a.

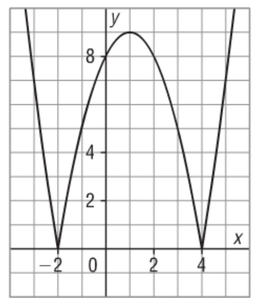


$y = |-2x + 9|$

Or (depending on what you choose as the original line)

$y = |3x - 9|$

b.



$y = |(x-1)^2 - 9|$

19. Graph the following functions on the graph paper provided. **Explain** your procedure.

Use <u>full english sentences</u> to explain the process you used!

$$y = -2x^2 - 3 \text{ and } y = \frac{1}{-2x^2 - 3}$$

<u>Step 1</u>: I first graphed the f(x) graph $y = -2x^2 - 3$ by using the y-intercept (0, -3) and vertex (0,-3) and using the vertical stretch value ($a = -2$) to find my other points on the graph.

<u>Step 2</u>: The horizontal asymptote of the function is y = 0 and there are no vertical asymptotes because there are no x-intercepts on the function, f (x)

<u>Step 3:</u> To graph the reciprocal function, $\frac{1}{f(x)}$, tehe reciprocal of the vertex was found to be $\left(0, -\frac{1}{3}\right)$. Then using a table of values more points on the $\frac{1}{f(x)}$ graph could be found to give me the final graph of $\frac{1}{f(x)}$