

1. Evaluate the following expressions:

a. $|-6| - |-3| = 6 - 3 = 3$

b. $-4|-12 - (-14)| = -4|2| = -8$

c. $|-2(4-7)^2 + 8| = |-10| = 10$

2. Arrange from least to greatest.

a. $\overset{\textcircled{2}}{-4}$, $\overset{\textcircled{4}}{4}$, $\overset{\textcircled{3}}{-3}$, $\overset{\textcircled{1}}{-7}$
 $-|3-7|$, $|-(3-7)|$, $-|5-|-2||$, $-|5|-|-2|$

b. $\overset{\textcircled{1}}{-4}$, $\overset{\textcircled{5}}{\sqrt{9}}$, $\overset{\textcircled{6}}{|-3.5|}$, $\overset{\textcircled{2}}{-2.7}$, $\overset{\textcircled{7}}{|-\frac{9}{2}|}$, $\overset{\textcircled{4}}{|-1.6|}$, $\overset{\textcircled{3}}{|1\frac{1}{2}|}$

3. The graph of $y = f(x)$ has x -intercepts at -4 and 6 and a y -intercept at $-\frac{2}{3}$. State the x and y intercepts of $y = |f(x)|$

x -int: -4 and 6 y -int: $+\frac{2}{3}$

4. Without sketching the graph, state the intercepts and the domain and range for $y = |5x - 2|$.

y -int: $y = |-2| = 2$ $(0, 2)$ domain: \mathbb{R}
 x -int: $0 = 5x - 2$ $(\frac{2}{5}, 0)$ range: $y \geq 0$

5. Without sketching the graph, state the intercepts and the domain and range for $y = |7x^2 + 27x - 4|$.

$\frac{7}{11} \frac{1}{4}$ y -int: $y = |-4| = 4$ $(0, 4)$ domain: \mathbb{R}
 x -int: $0 = 7x^2 + 27x - 4$ $(\frac{1}{7}, 0) + (-4, 0)$ range: $y \geq 0$
 $0 = (7x - 1)(x + 4)$

6. Graph the absolute value function $y = |-3x - 6|$

a) Intercepts

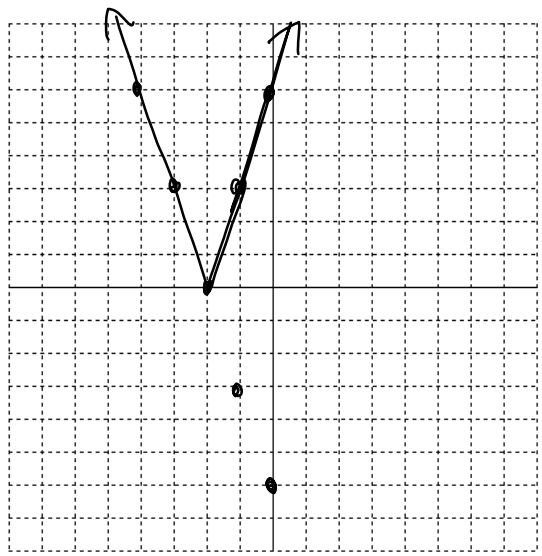
$$x\text{-int} : (-2, 0)$$

$$y\text{-int} : (0, 6)$$

b) Domain and Range

$$\text{domain} : \{x \mid x \in \mathbb{R}\}$$

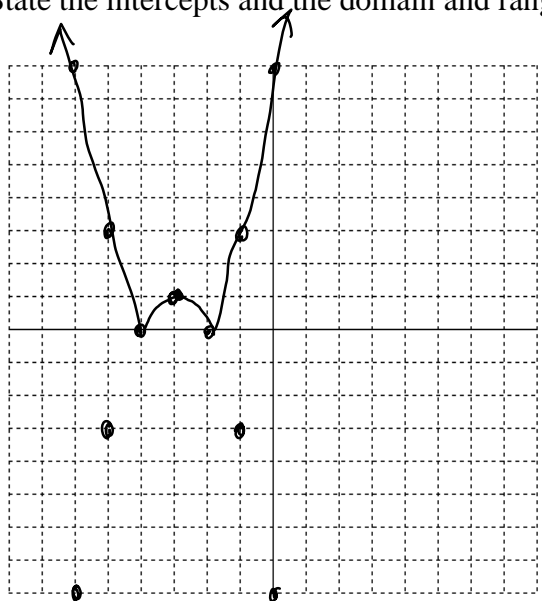
$$\text{range} : \{y \mid y \geq 0, y \in \mathbb{R}\}$$



7. Graph the absolute value function $y = |-x^2 - 6x - 8|$. State the intercepts and the domain and range.

$$y = -(x^2 + 6x + 9 - 9) - 8$$

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



a) Intercepts $x\text{-int} : (-2, 0) (-4, 0)$
 $y\text{-int} : (0, 8)$

b) Domain and Range

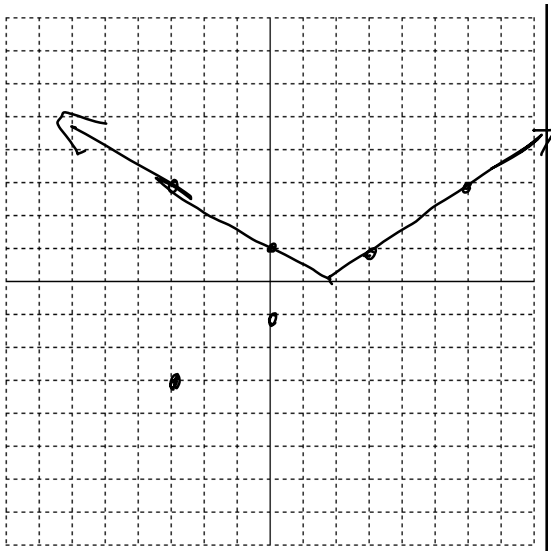
$$\text{domain} : \mathbb{R}$$

$$\text{range} : y \geq 0$$

8. Graph the following absolute value functions:

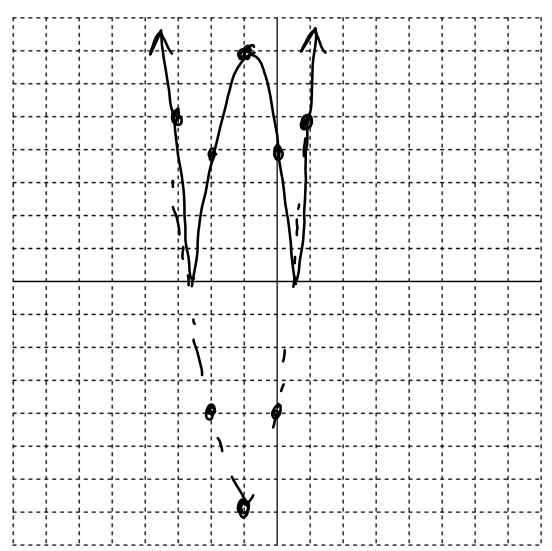
a. $y = \left| \frac{2}{3}(x+9) - 7 \right|$

$y = \left| \frac{2}{3}x - 1 \right|$

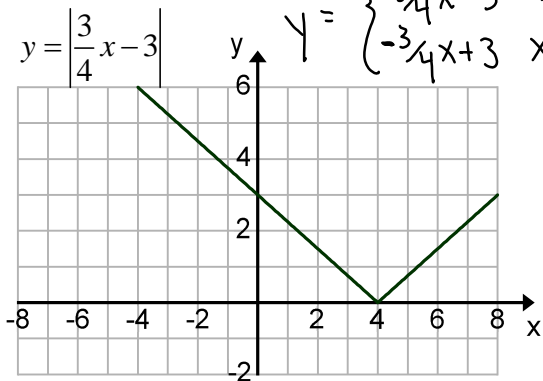


b. $y = |3x^2 + 6x - 4|$

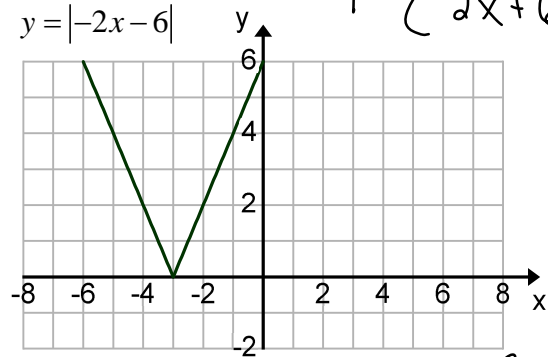
$y = 3(x^2 + 2x + 1) - 4$
 $y = 3(x+1)^2 - 7$



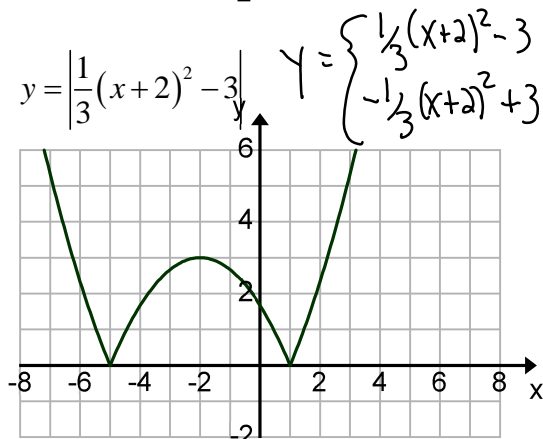
9. Write the piecewise function that represents each graph:



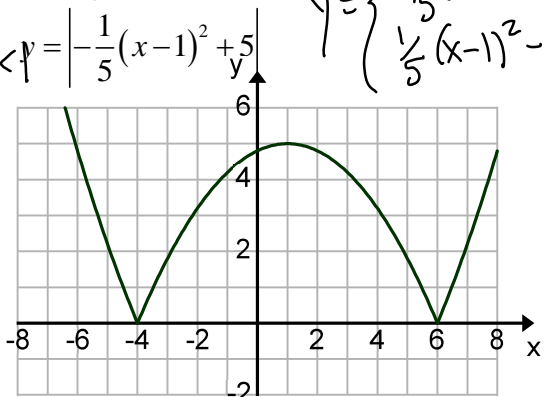
$y = \begin{cases} \frac{3}{4}x - 3 & x \geq 4 \\ -\frac{3}{4}x + 3 & x < 4 \end{cases}$



$y = \begin{cases} -2x - 6 & x \leq -3 \\ 2x + 6 & x > -3 \end{cases}$



$y = \begin{cases} \frac{1}{3}(x+2)^2 - 3 & x < -1 \text{ or } x \leq -5 \\ -\frac{1}{3}(x+2)^2 + 3 & -5 < x < 1 \\ \frac{1}{3}(x-1)^2 + 5 & x > 1 \end{cases}$



$y = \begin{cases} -\frac{1}{5}(x-1)^2 + 5 & -4 \leq x \leq 6 \\ \frac{1}{5}(x-1)^2 - 5 & x < -4 \text{ or } x > 6 \end{cases}$

Solve and check the following absolute value equations

<p>1. $3x - 5 = 12$</p> $3x - 5 = 12 \quad -3x + 5 = 12$ $3x = 17 \quad -3x = 7$ $\boxed{x = \frac{17}{3}} \checkmark \quad \boxed{x = -\frac{7}{3}} \checkmark$	<p>2. $\frac{3}{4}x + 3 = 7$</p> $\frac{3}{4}x + 3 = 7 \quad -\frac{3}{4}x - 3 = 7$ $\frac{3}{4}x = 4 \quad -\frac{3}{4}x = 10$ $\boxed{x = \frac{16}{3}} \checkmark \quad \boxed{x = -\frac{40}{3}} \checkmark$
<p>3. $2x - 7 = x + 5$</p> $2x - 7 = x + 5 \quad -2x + 7 = x + 5$ $\boxed{x = 12} \checkmark \quad \begin{matrix} 2 = 3x \\ \frac{2}{3} = x \end{matrix} \checkmark$ <p>LS = 17 RS = 17</p> <p>LS = $\frac{17}{3}$ RS = $\frac{17}{3}$</p>	<p>4. $-4x + 3 = 2x - 7$</p> $-4x + 3 = 2x - 7 \quad 4x - 3 = 2x - 7$ $10 = 6x \quad 2x = -4$ $\cancel{\frac{5}{3} = x} \quad \cancel{x = -2}$ <p style="text-align: center;">\bigcirc</p>
<p>5. $7x - 16 = x^2 - 4$</p> <div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> $7x - 16 = x^2 - 4$ $0 = x^2 - 7x + 12$ $0 = (x - 4)(x - 3)$ $\boxed{x = 3, 4} \checkmark \checkmark$ </div> <div style="width: 45%;"> $-7x + 16 = x^2 - 4$ $0 = x^2 + 7x - 20$ $x = \frac{-7 \pm \sqrt{49 + 80}}{2}$ $\boxed{x = \frac{-7 \pm \sqrt{129}}{2}} \checkmark \checkmark$ </div> </div>	
<p>6. $x^2 - 6x = x$</p> <div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> $x^2 - 6x = x$ $x^2 - 7x = 0$ $x(x - 7) = 0$ $\boxed{x = 0, 7} \checkmark \checkmark$ </div> <div style="width: 45%;"> $-x^2 + 6x = x$ $0 = x^2 - 5x$ $0 = x(x - 5)$ $\boxed{x = 0, 5} \checkmark \checkmark$ </div> </div>	

$$7. 3x - 1 = |4x^2 - x - 4|$$

$$3x - 1 = 4x^2 - x - 4$$

$$\frac{2}{2} \frac{+1}{-3} \quad 0 = 4x^2 - 4x - 3$$

$$0 = (2x + 1)(2x - 3)$$

$$x = \cancel{\frac{-1}{2}}, \boxed{\frac{3}{2}} \checkmark$$

$$LS = -2.5 \quad LS = 7/2$$

$$RS = |2.5| \quad RS = 7/2$$

$$3x - 1 = -4x^2 + x + 4$$

$$4x^2 + 2x - 5 = 0$$

$$x = \frac{-2 \pm \sqrt{4 - 4(4)(-5)}}{8}$$

$$= \frac{-2 \pm \sqrt{84}}{8}$$

$$= \frac{-2 \pm 2\sqrt{21}}{8}$$

$$x = \boxed{\frac{-1 + \sqrt{21}}{4}} \checkmark, \cancel{\frac{-1 - \sqrt{21}}{4}}$$

$$8. x + 3 = |x^2 - 6x|$$

$$x + 3 = x^2 - 6x$$

$$0 = x^2 - 7x - 3$$

$$x = \frac{7 \pm \sqrt{49 - 4(-3)}}{2}$$

$$x = \boxed{\frac{7 \pm \sqrt{61}}{2}}$$

$$LS = 10.405 \quad LS = 2.59$$

$$RS = 10.405 \quad LS = 2.59$$

$$x + 3 = -x^2 + 6x$$

$$x^2 - 5x + 3 = 0$$

$$x = \frac{5 \pm \sqrt{25 - 12}}{2}$$

$$x = \boxed{\frac{5 \pm \sqrt{13}}{2}}$$

$$LS = 7.30 \quad LS = 3.70$$

$$RS = 7.30 \quad RS = 3.70$$

Reciprocals

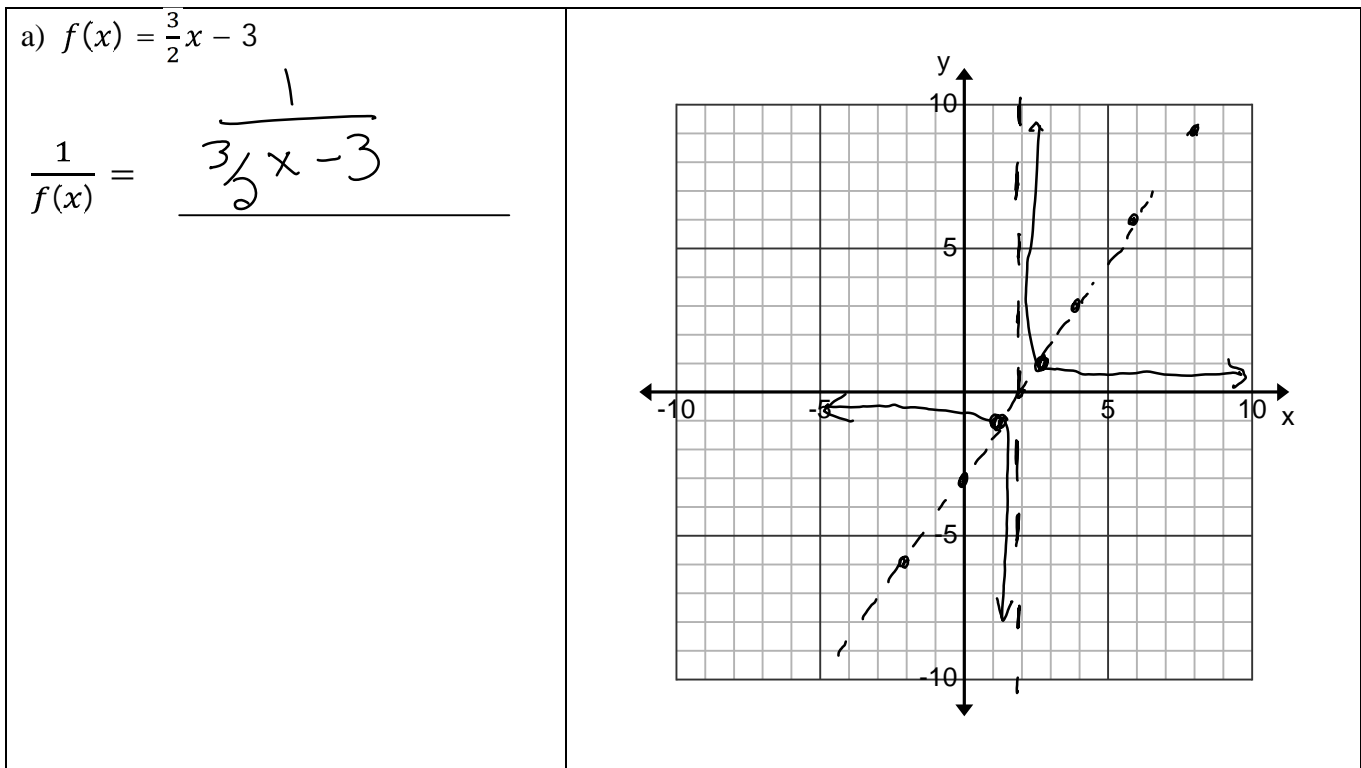
1. Determine the reciprocal of the following coordinates.

a) $(5, -3)$ $(5, -\frac{1}{3})$	b) $(-\frac{2}{3}, \frac{3}{4})$ $(-\frac{2}{3}, \frac{4}{3})$	c) $(-4, -\frac{1}{7})$ $(-4, -7)$
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2. Write the reciprocal $(\frac{1}{f(x)})$ for the following functions.

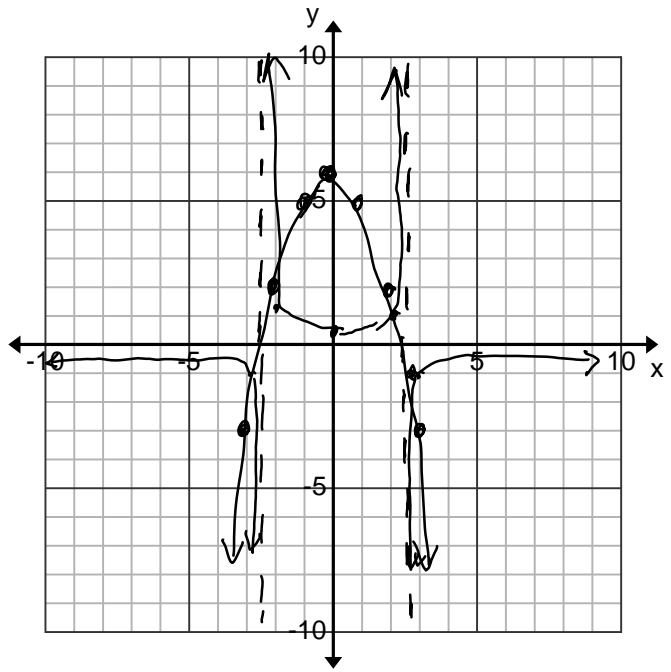
a) $f(x) = 7x - 1$ $y = \frac{1}{7x-1}$	b) $f(x) = \frac{1}{x^2-5x+3}$ $y = x^2 - 5x + 3$
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3. Graph the original function and then its reciprocal $(\frac{1}{f(x)})$.



b) $f(x) = -x^2 + 6$

$$\frac{1}{f(x)} = \frac{1}{x^2 + 6}$$

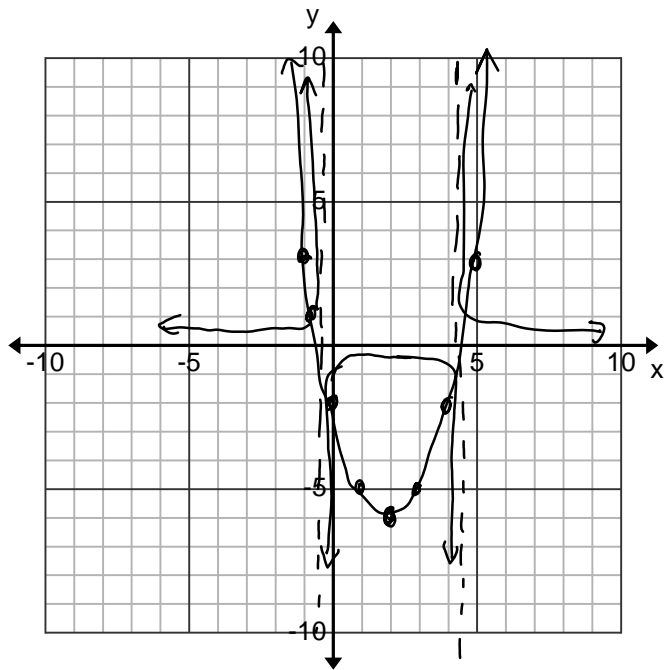


c) $f(x) = \frac{1}{x^2 - 4x - 2}$

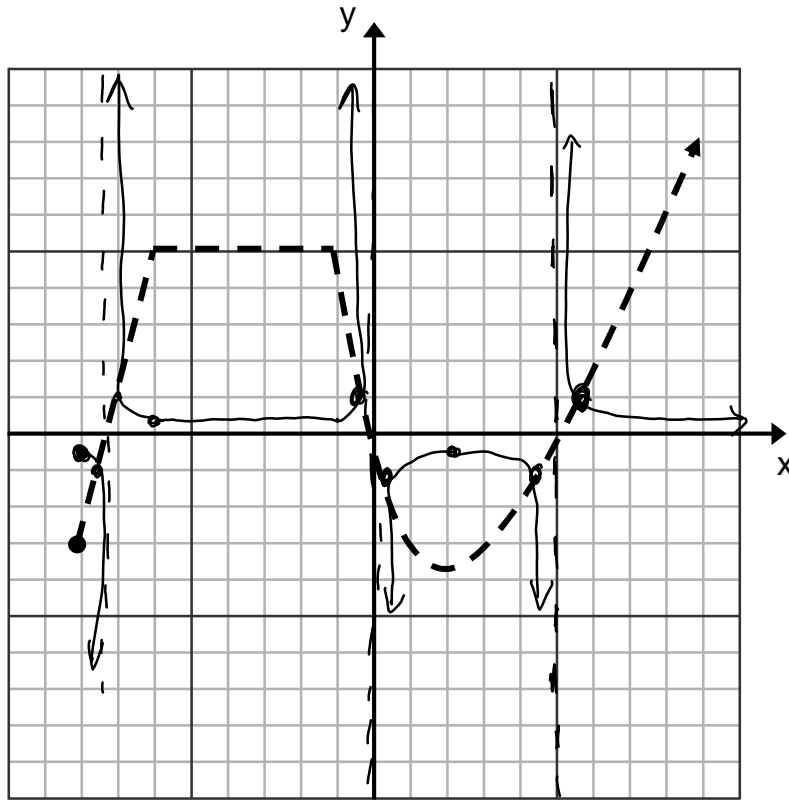
$$\frac{1}{f(x)} = x^2 - 4x - 2$$

$$y = x^2 - 4x + 4 - 4 - 2$$

$$y = (x - 2)^2 - 6$$



4. Graph the reciprocal $\left(\frac{1}{f(x)}\right)$ for the following function:



5. Draw the graph of the original function $y = f(x)$.

