Assignment

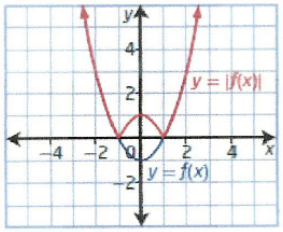
Complete pgs. 376 - 377

Questions 7, 8(abe), 9, 10

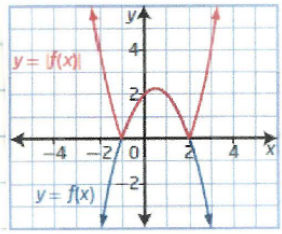
Solutions

7. Copy the graph of $y=f(x)$. On the same set of axes, sketch the graph of $y=|f(x)|$.

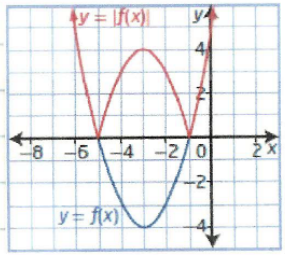
a)



b)



c)



Solutions

8. Sketch the graph of each function. State the intercepts and the domain and range.

a) $y = |x^2 - 4|$

① Determine the y-int:

$y = |(0)^2 - 4|$
$y = |0 - 4|$
$y = |-4|$
$y = 4$

② Determine the x-ints:

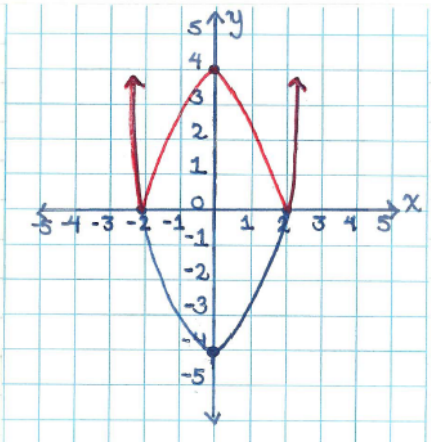
$0 = |x^2 - 4|$
$\Rightarrow 0 = x^2 - 4$
$0 = (x-2)(x+2)$
$x - 2 = 0$ or $x + 2 = 0$
$x = 2$ $\quad$ $x = -2$

③ Complete the square to determine the vertex:

$y = |x^2 - 4|$
$\Rightarrow y = x^2 - 4$
$y = (x-0)^2 - 4$ (We just need to rewrite in this case)

Vertex: $(0, -4)$

④ Graph:



⑤ Domain:
$\{x \mid x \in R\}$

Range:
$\{y \mid y \geq 0, y \in R\}$

Solutions

b) $y = |x^2 + 5x + 6|$

① Determine the y-int:

$y = |(0)^2 + 5(0) + 6|$

$y = |0 + 0 + 6|$

$y = |6|$

$y = 6$

② Determine the x-ints:

$0 = |x^2 + 5x + 6|$

$\Rightarrow 0 = x^2 + 5x + 6$

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

$x+2=0$ or $x+3=0$

$x = -2$ $\quad x = -3$

③ Complete the square to determine the vertex:

$y = |x^2 + 5x + 6|$

$\Rightarrow y = x^2 + 5x + 6$

$y = (x^2 + 5x) + 6$

$y = \left(x^2 + 5x + \frac{25}{4} - \frac{25}{4}\right) + 6$

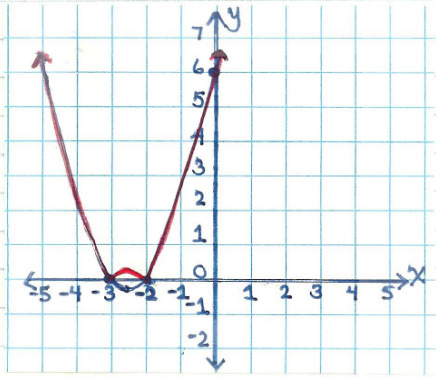
$y = \left(x^2 + 5x + \frac{25}{4}\right) - \frac{25}{4} + \frac{6}{1}$

$y = \left(x + \frac{5}{2}\right)^2 - \frac{25}{4} + \frac{24}{4}$

$y = \left(x + \frac{5}{2}\right)^2 - \frac{1}{4}$

Vertex: $\left(-\frac{5}{2}, -\frac{1}{4}\right)$

④ Graph:



⑤ Domain:

$\{x \mid x \in R\}$

Range:

$\{y \mid y \geq 0, y \in R\}$

Solutions

e) $g(x) = |(x-3)^2 + 1|$

① Determine the y-int:

$y = |(0-3)^2 + 1|$
$y = |(-3)^2 + 1|$
$y = |9 + 1|$
$y = |10|$
$y = 10$

② Determine the x-ints:

$0 = |(x-3)^2 + 1|$
$\Rightarrow 0 = (x-3)^2 + 1$
$0 = (x-3)(x-3) + 1$
$0 = x^2 - 3x - 3x + 9 + 1$
$0 = x^2 - 6x + 10$

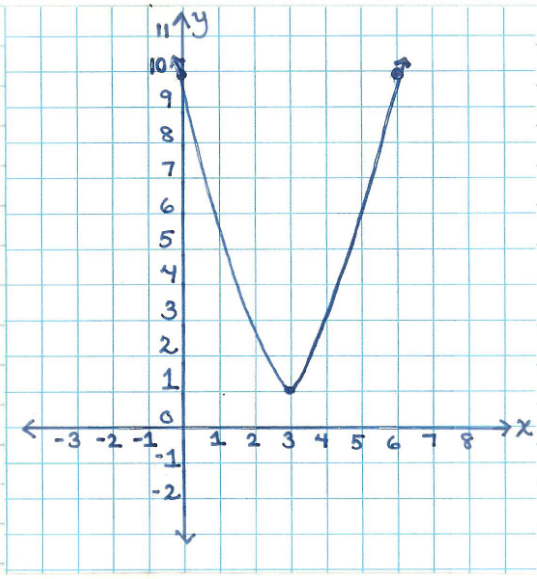
* Cannot be factored
↳ No x-ints.

③ Complete the square to determine the vertex:

$y = |(x-3)^2 + 1|$
$\Rightarrow y = (x-3)^2 + 1$ (Already in vertex form !!)

Vertex: (3,1)

④ Graph:

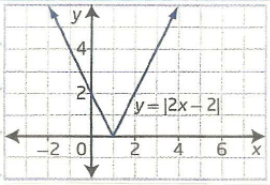


⑤ Domain:
$\{x \mid x \in R\}$

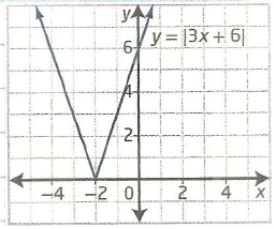
Range:
$\{y \mid y \geq 1, y \in R\}$

Solutions

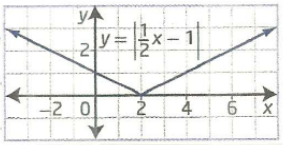
9. Write the piecewise function that represents each graph.

a) 

$$y = \begin{cases} 2x-2, & \text{if } x \geq 1 \\ -(2x-2), & \text{if } x < 1 \end{cases}$$

b) 

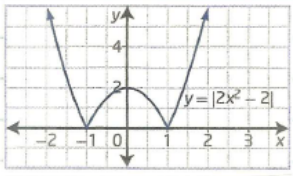
$$y = \begin{cases} 3x+6, & \text{if } x \geq -2 \\ -(3x+6), & \text{if } x < -2 \end{cases}$$

c) 

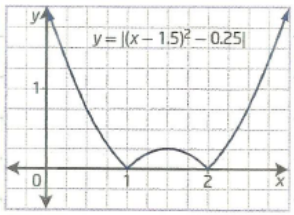
$$y = \begin{cases} \frac{1}{2}x-1, & \text{if } x \geq 2 \\ -(\frac{1}{2}x-1), & \text{if } x < 2 \end{cases}$$

Solutions

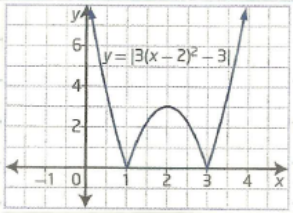
10. What piecewise function could you use to represent each graph of an absolute value function?

a) 

$$y = \begin{cases} 2x^2-2, & \text{if } x \le -1 \text{ or } x \ge 1 \\ -(2x^2-2), & \text{if } -1 < x < 1 \end{cases}$$

b) 

$$y = \begin{cases} (x-1.5)^2-0.25, & \text{if } x \le 1 \text{ or } x \ge 2 \\ -[(x-1.5)^2-0.25], & \text{if } 1 < x < 2 \end{cases}$$

c) 

$$y = \begin{cases} 3(x-2)^2-3, & \text{if } x \le 1 \text{ or } x \ge 3 \\ -[3(x-2)^2-3], & \text{if } 1 < x < 3 \end{cases}$$