

3.3 Piecewise Functions

PRACTICE

Use the piecewise function to evaluate the following.

1.

$$f(x) = \begin{cases} -2x^2 - 1, & x \leq 2 \\ \frac{4}{5}x - 4, & x > 2 \end{cases}$$

$$\begin{aligned} \text{a. } f(0) &= \underline{-1} \\ -2(0)^2 - 1 \\ -2(0) - 1 \\ 0 - 1 \\ -1 \end{aligned}$$

$$\begin{aligned} \text{b. } f(5) &= \underline{0} \\ \frac{4}{5}(5) - 4 \\ 4 - 4 \\ 0 \end{aligned}$$

$$\begin{aligned} \text{c. } f(2) &= \underline{-9} \\ -2(2)^2 - 1 \\ -2(4) - 1 \\ -8 - 1 \\ -9 \end{aligned}$$

$$\begin{aligned} \text{d. } f(-3) &= \underline{-19} \\ -2(-3)^2 - 1 \\ -2(9) - 1 \\ -18 - 1 \\ -19 \end{aligned}$$

2.

$$f(x) = \begin{cases} x^3 - 7x, & x \leq -3 \\ 8, & -3 < x \leq 3 \\ \sqrt{2x+3}, & x > 3 \end{cases}$$

$$\begin{aligned} \text{a. } f(-5) &= \underline{-90} \\ (-5)^3 - 7(-5) \\ -125 + 35 \\ -90 \end{aligned}$$

$$\begin{aligned} \text{b. } f(11) &= \underline{5} \\ \sqrt{2(11)+3} \\ \sqrt{22+3} \\ \sqrt{25} \\ 5 \end{aligned}$$

$$\text{c. } f(0) = \underline{8}$$

$$\text{d. } f(3) = \underline{8}$$

3.

$$f(x) = \begin{cases} \frac{3}{x+4}, & x < -5 \\ x^2 - 3x, & -5 < x \leq 0 \\ x^4 - 7, & x > 0 \end{cases}$$

$$\begin{aligned} \text{a. } f(-1) &= \underline{4} \\ \frac{3}{(-1)+4} \\ \frac{3}{1+3} \\ \frac{3}{4} \end{aligned}$$

$$\begin{aligned} \text{b. } f(4) &= \underline{249} \\ (4)^4 - 7 \\ 256 - 7 \\ 249 \end{aligned}$$

$$\begin{aligned} \text{c. } f(-10) &= \underline{-\frac{1}{2}} \\ \frac{3}{-10+4} = \frac{3}{-6} = -\frac{1}{2} \end{aligned}$$

$$\begin{aligned} \text{d. } f(0) &= \underline{0} \\ (0)^2 - 3(0) \\ 0 - 0 \\ 0 \end{aligned}$$

4.

$$f(x) = \begin{cases} |2x+7|, & x \leq -4 \\ 1+x^2, & -4 < x \leq 1 \\ 6, & 1 < x < 3 \\ \frac{1}{3}x+8, & x \geq 3 \end{cases}$$

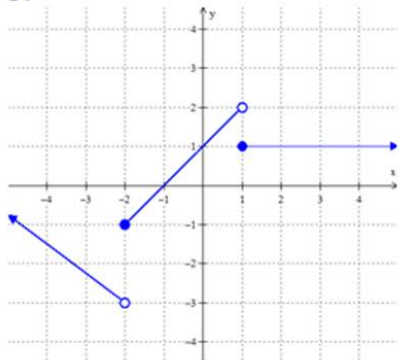
$$\begin{aligned} \text{a. } f(5) &= \underline{\frac{29}{3} = 9.\bar{6}} \\ \frac{1}{3}(5)+8 \\ \frac{5}{3}+8 \\ \frac{29}{3} \end{aligned}$$

$$\begin{aligned} \text{b. } f(1) &= \underline{2} \\ 1+(1)^2 \\ 1+1 \\ 2 \end{aligned}$$

$$\begin{aligned} \text{c. } f(-4) &= \underline{1} \\ |2(-4)+7| \\ |-8+7| \\ |-1| \\ 1 \end{aligned}$$

$$\text{d. } f(2) = \underline{6}$$

5.



a. $f(-1) = 0$

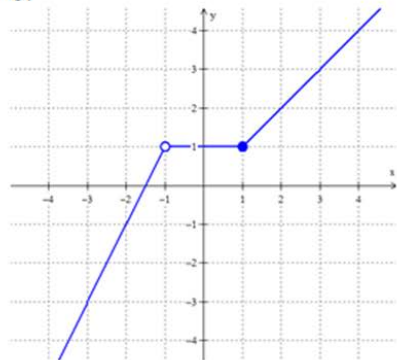
b. $f(2) = 1$

c. $f(1) = 1$

d. $f(-2) = -1$

e. $f(0) = 1$

6.



a. $f(-3) = -3$

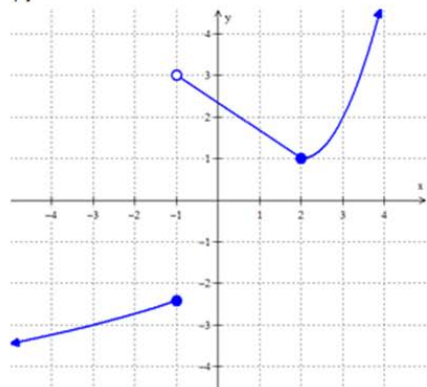
b. $f(4) = 4$

c. $f(1) = 1$

d. $f(-1) = \text{DNE}$

e. $f(0) = 1$

7.



a. $f(3) = 2$

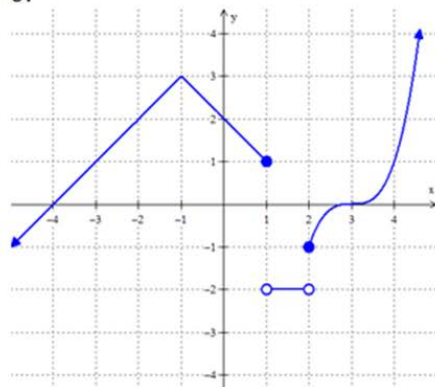
b. $f(-1) = -2.5$

c. $f(-3) = -3$

d. $f(2) = 1$

e. $f(0.5) = 2$

8.



a. $f(-4) = 0$

b. $f(1) = 1$

c. $f(3) = 0$

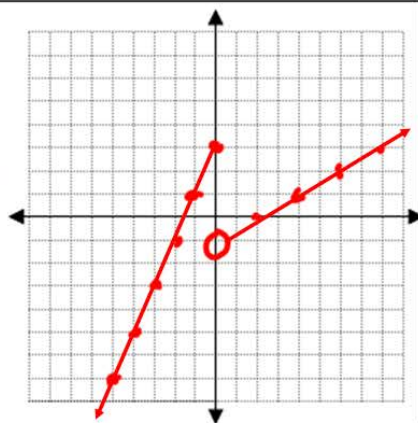
d. $f(2) = -1$

e. $f(1.5) = -2$

Graph the following piecewise functions.

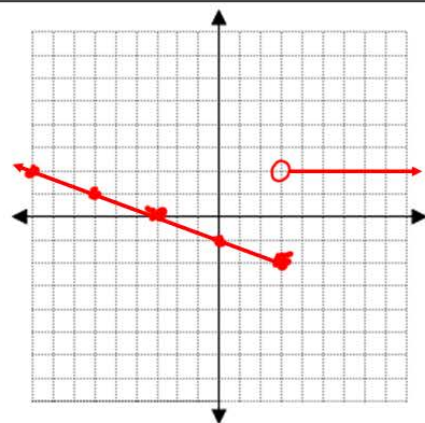
9.

$$f(x) = \begin{cases} 2x + 3, & x \leq 0 \\ \frac{1}{2}x - 1, & x > 0 \end{cases}$$



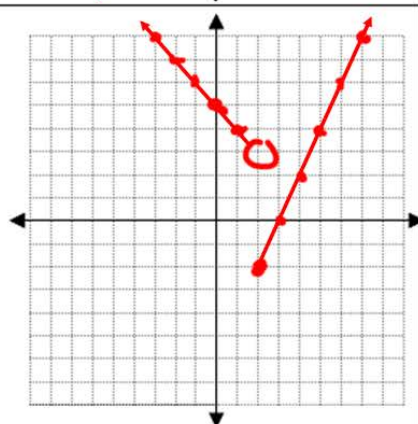
10.

$$f(x) = \begin{cases} -\frac{1}{3}x - 1, & x \leq 3 \\ 2, & x > 3 \end{cases}$$



11.

$$f(x) = \begin{cases} 4 - x, & x < 2 \\ 2x - 6, & x \geq 2 \end{cases}$$



12.

$$f(x) = \begin{cases} \frac{2}{3}x + 3, & x \leq 0 \\ 3, & 0 < x < 2 \\ -\frac{1}{2}x, & x \geq 2 \end{cases}$$

