# 3.3 Piecewise Functions

Key

**PRACTICE**

**Use the piecewise function to evaluate the following.**

1.

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

a. $f(0)=-2(0)^2-1$ → $-1$

b. $f(5)=\frac{4}{5}(5)-4$ → $0$

c. $f(2)=-2(2)^2-1$

$-8-1$ → $-9$

d. $f(-3)=-2(-3)^2-1$

$-2(9)-1$ → $-19$

2.

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

a. $f(-5)=$

$(-5)^3-7(-5)$

$-125+35$

$-90$

b. $f(11)=\sqrt{2(11)+3}$ → $5$

c. $f(0)=$ $8$

d. $f(3)=$ $8$

3.

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

a. $f(-1)=(-1)^2-3(-1)$

$1+3$ → $4$

b. $f(4)=(4)^4-7$

$256-7$ → $249$

c. $f(-10)=\frac{3}{-10+4}=\frac{3}{-6}$ → $\frac{-1}{2}$

d. $f(0)=0^2-3(0)$ → $0$

4.

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

a. $f(5)=\frac{1}{3}(5)+8$

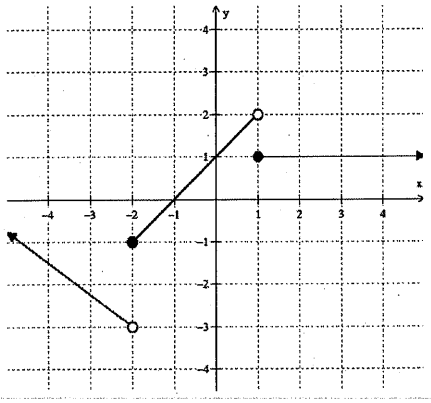
$\frac{5}{3}+\frac{24}{3}=\frac{29}{3}$

b. $f(1)=1+(1)^2$ → $2$

c. $f(-4)=|2(-4)+7|$ → $1$

d. $f(2)=$ $6$

5.



a. $f(-1)=$ $0$

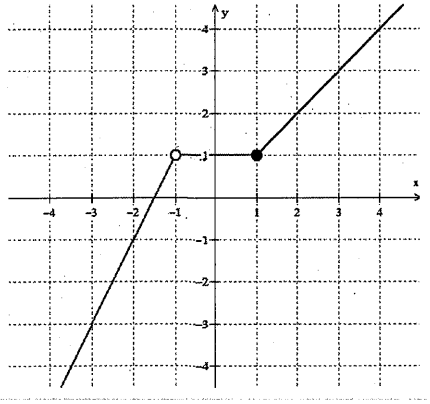
b. $f(2)=$ $1$

c. $f(1)=$ $1$

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

e. $f(0)=$ $1$

6.



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

b. $f(4)=$ $4$

c. $f(1)=$ $1$

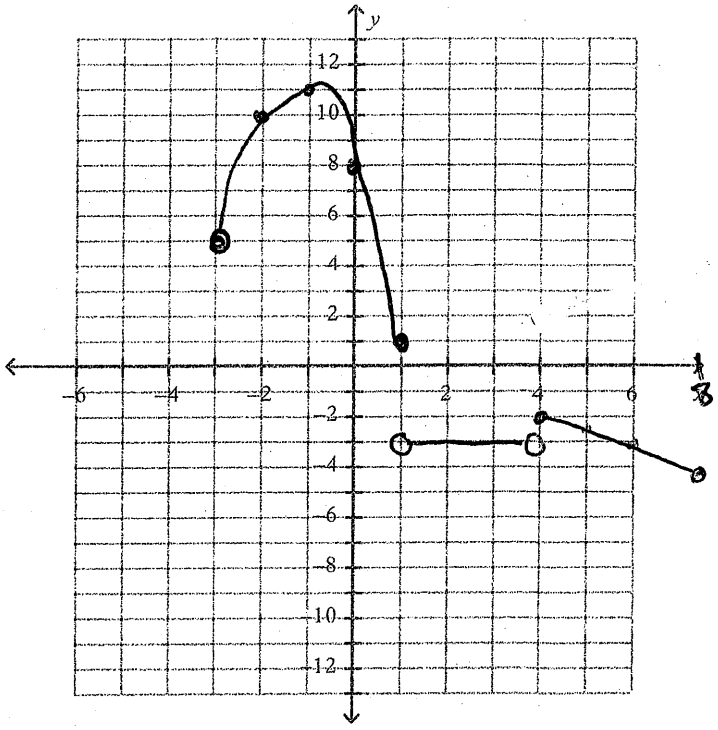
d. $f(-1)=$ undefined

e. $f(0)=$ $1$

Key

## Piecewise Functions

1. $g(x) = \begin{cases} -2x^2 - 5x + 8, & -3 < x \leq 1 \\ -3, & 1 < x < 4 \\ -\frac{x}{2}, & 4 \leq x \leq 8 \end{cases}$




a. What is the domain of g(x)?
$(-3, 8]$

b. What is the range for step 1?
$[1, 11.25]$

(Use your calculator to find the maximum)

c. Find g(1) = 1

d. Find g(4) = −2

e. Graph the function.

f. What are the maximum and minimum values of g(x)

$-2x^2-5x+8$

| | |
|---|---|
| −3 | 5 |
| −2 | 10 |
| −1 | 11 |
| 0 | 8 |
| 1 | 1 |

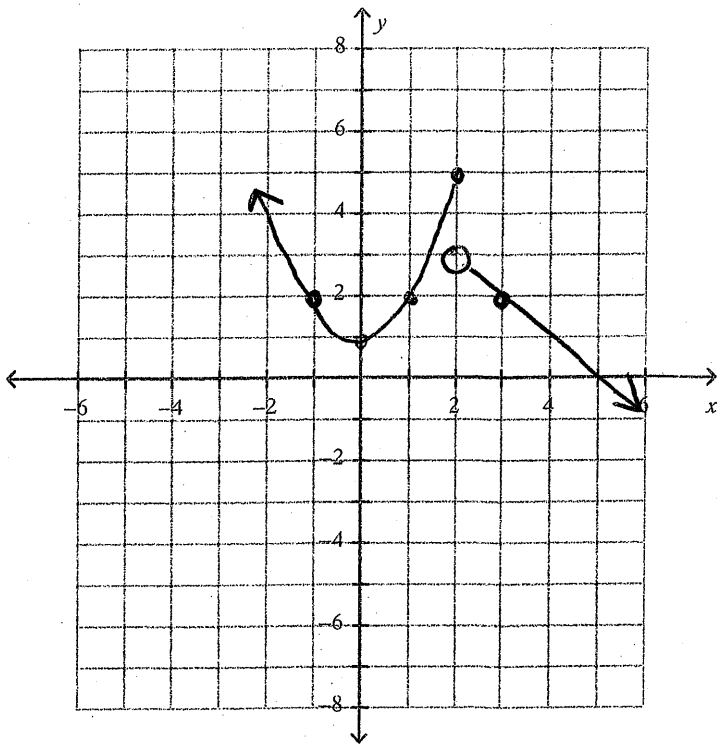
$-3$

| | |
|---|---|
| 1 | −3 |
| 2 | −3 |
| 3 | −3 |
| 4 | −3 |

$\frac{-x}{2}$

| | |
|---|---|
| 4 | 2 |
| 5 | 2.5 |
| 6 | 3 |
| 7 | 3.5 |
| 8 | 4 |

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




a. What is the domain of f(x)? $(-\infty, \infty)$

b. What is the range for step 1? $[1, \infty)$

c. Find f(1) = 2

d. Find f(2) = 5

e. Graph the function.

f. What are the maximum and minimum values of g(x)? No maximum
No minimum

$x^2$

| | |
|---|---|
| 2 | 5 |
| 1 | 2 |
| 0 | 1 |
| −1 | 2 |

$5-x$

| | |
|---|---|
| 2 | 3 |
| 3 | 2 |
| 4 | 1 |