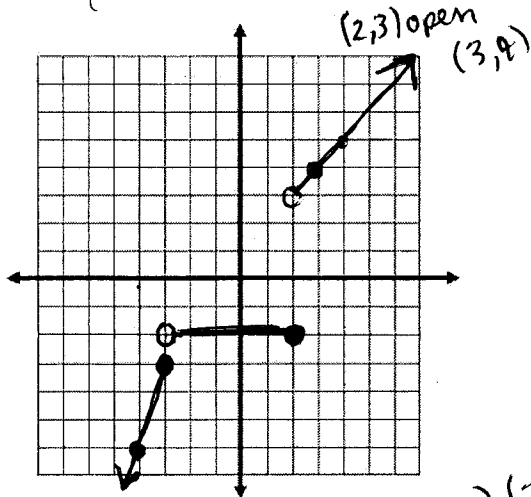


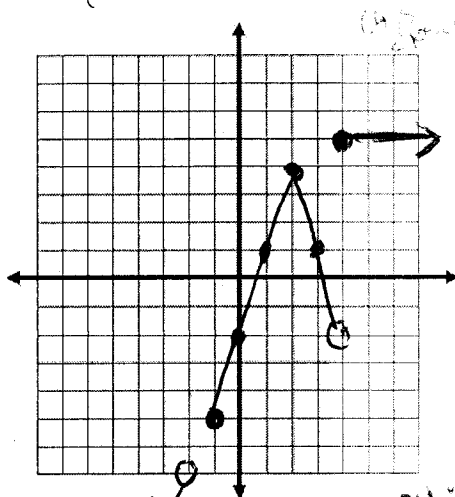
Graphing Piecewise Functions

Example 1 Graph each piecewise function:

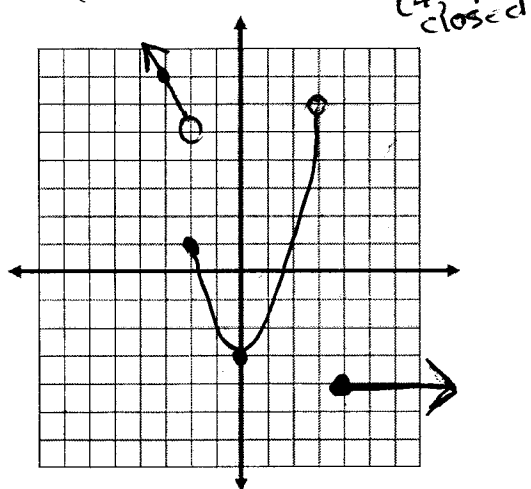
A. $y = \begin{cases} 3x+6 & \text{for } x \leq -3 \\ -2 & \text{for } -3 < x \leq 2 \\ x+1 & \text{for } x > 2 \end{cases}$



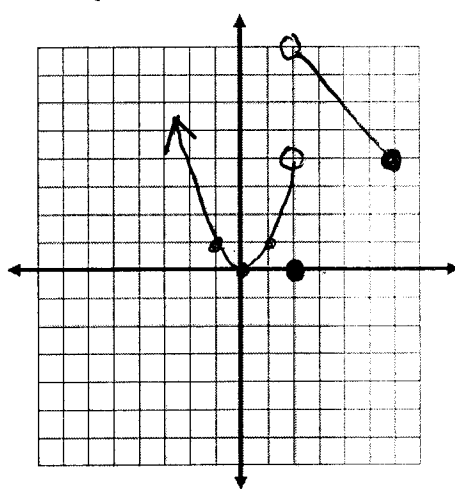
B. $y = \begin{cases} 3x-1 & \text{for } x < -2 \\ -3|x-2|+4 & \text{for } -1 \leq x < 4 \\ 5 & \text{for } x \geq 4 \end{cases}$



C. $y = \begin{cases} -2x+1 & \text{for } x < -2 \\ x^2-3 & \text{for } -2 \leq x < 3 \\ -4 & \text{for } x \geq 4 \end{cases}$

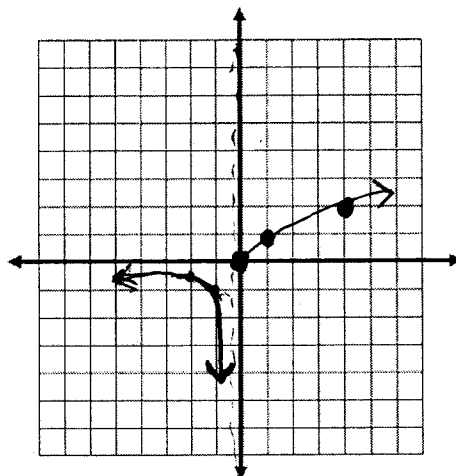


D. $y = \begin{cases} x^2 & \text{for } x < 2 \\ 0 & \text{for } x = 2 \\ 10-x & \text{for } 2 < x \leq 6 \end{cases}$

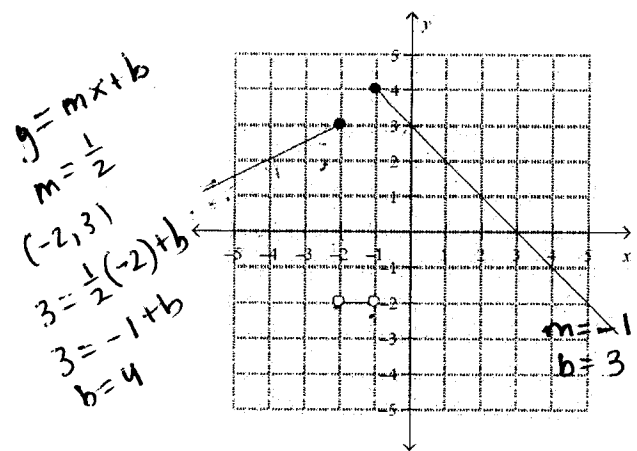


Example 2 Graph the piecewise function:

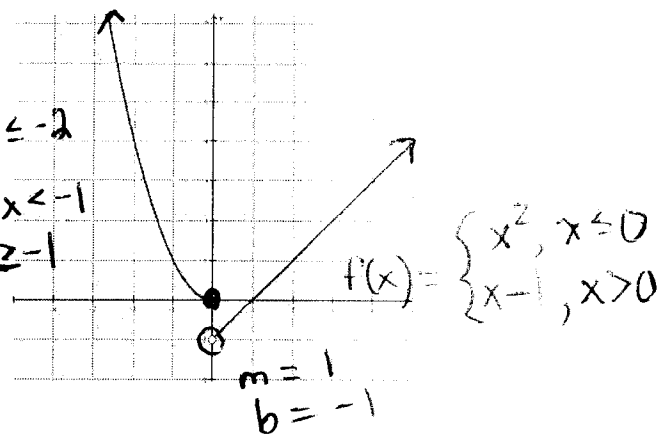
$f(x) = \begin{cases} \frac{1}{x} & \text{if } x < 0 \\ x & \text{if } x \geq 0 \end{cases}$



Example 3 Given a graph, find a piecewise function that describes it:



$$f(x) = \begin{cases} \frac{1}{2}x + 4, & x \leq -1 \\ -2, & -1 < x < 0 \\ -x + 3, & x \geq 0 \end{cases}$$



Applications of Piecewise Functions

Example 4 In May 2012, Powell Gas had the following rate schedule for natural gas usage in single-family residences:

Monthly Customer Charge \$6.45

Distribution Charge

1st 20 therms \$0.2012/therm

Next 30 therms \$0.1117/therm

Over 50 therms \$0.0374/therm

Gas supply charge \$0.7268/therm

- What is the charge for using 40 therms?
- What is the charge for using 202 therms?
- Construct a function that gives the monthly charge C for x therms of gas.
- ~~Graph the function.~~

A. $6.45 + 20(.2012) + 20(.1117) + 40(.7268) = \41.78

B. $6.45 + 20(.2012) + 30(.1117) + 152(.0374) + 202(.7268) = \166.32

C.
$$C(x) = \begin{cases} 6.45 + x(.2012) + .7268x, & 0 \leq x \leq 20 \\ 6.45 + 20(.2012) + (x-20).1117 + .7268x, & 20 < x \leq 50 \\ 6.45 + 20(.2012) + 30(.1117) + (x-50)(.0374) + .7268x, & x > 50 \end{cases}$$

$$C(x) = \begin{cases} .928x + 6.45, & 0 \leq x \leq 20 \\ .8385x + 8.24, & 20 < x \leq 50 \\ .7642x + 11.955, & x > 50 \end{cases}$$

Example 5 An economy car costs \$95 per week. Extra days cost \$24 per day until the rate exceeds the weekly rate, in which case the weekly rate applies. Find the cost C of renting an economy car as a piecewise-defined function of the number x of days used, where $7 \leq x \leq 14$. Graph the function.

$C(x)$ cost of renting a car
 $x = \#$ days

$$C(x) = \begin{cases} 95 + 24(x-7), & 7 \leq x \leq 10 \\ 190, & 11 \leq x \leq 14 \end{cases}$$

\uparrow integer
 \uparrow integer

x	$C(x)$ cost	
7	95	$95 + 24(0)$
8	119	$95 + 24(1)$
9	143	$95 + 24(2)$
10	167	$95 + 24(3)$
11	190	
12	190	
13	190	
14	190	

