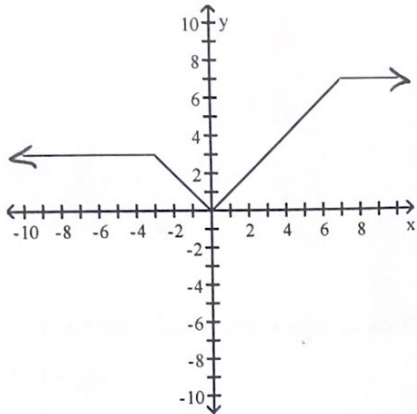


Chapter 1 Examples 2022

Name Key

Example 1: Use the graph to identify important characteristics.

1)



1) _____

$D: (-\infty, \infty)$
 $R: [0, 7)$

Examples 2-4: Determine whether the given function is even, odd, or neither.

2) $f(x) = 3x^3 + x^2 - 4$ $f(-x) = 3(-x)^3 + (-x)^2 - 4$
 $-3x^3 + x^2 - 4$

if:
 $f(x) = f(-x)$: Even
 $f(x) = -f(-x)$: Odd
Neither

3) $f(x) = 4x^2 + x^4$ $f(-x) = 4(-x)^2 + (-x)^4$
 $= 4x^2 + x^4$

3) Even

4) $f(x) = -2x^5 + x^3$ $f(-x) = -2(-x)^5 + (-x)^3$
 $2x^5 - x^3$

4) odd

Example 5: Evaluate the piecewise function at the given value of the independent variable.

5) $f(x) = \begin{cases} 5x - 3 & \text{if } x < -4 \\ 3x - 5 & \text{if } x \geq -4 \end{cases}; f(-3)$

5) -14

$f(-3) = 3(-3) - 5 = -14$

Example 6: Find and simplify the difference quotient $\frac{f(x+h) - f(x)}{h}$, $h \neq 0$ for the given function.

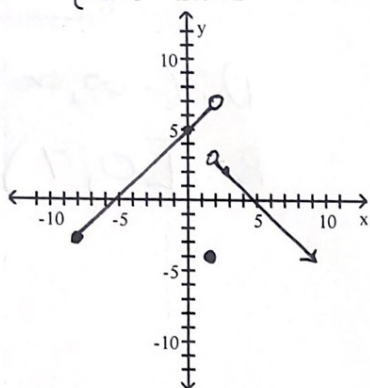
6) $f(x) = x^2 + 9x - 7$

6) $2x + h + 9$

$$\begin{aligned} &= \frac{(x+h)^2 + 9(x+h) - 7 - (x^2 + 9x - 7)}{h} \\ &= \frac{x^2 + 2hx + h^2 + 9x + 9h - 7 - x^2 - 9x + 7}{h} \\ &= \frac{2hx + h^2 + 9h}{h} = 2x + h + 9 \end{aligned}$$

Example 7: Graph the function.

$$7) f(x) = \begin{cases} x+5 & \text{if } -8 \leq x < 2 \\ -4 & \text{if } x=2 \\ -x+5 & \text{if } x > 2 \end{cases}$$



7) _____

Example 8: Use the given conditions to write an equation for the line in point-slope form.

8) Passing through (3, -6) with x-intercept = -2

(-2, 0)

8) _____

$$m = \frac{0 - (-6)}{-2 - 3} = \frac{6}{-5}$$

$$\boxed{\begin{aligned} y + 6 &= -\frac{6}{5}(x - 3) \\ \text{or} \\ y &= -\frac{6}{5}(x - 3) - 6 \end{aligned}}$$

Examples 9-10: Given functions f and g, perform the indicated operations.

9) $f(x) = 4x^2 - 7x$, $g(x) = x^2 - 5x - 14$

9) _____

Find $\frac{f}{g}$.

$$\boxed{\frac{4x^2 - 7x}{x^2 - 5x - 14} = \frac{x(4x - 7)}{(x - 7)(x + 2)}}$$

10) $f(x) = 7x - 9$, $g(x) = 2x - 4$

Find $f - g$.

10) 5x - 5

$$7x - 9 - (2x - 4)$$

$$7x - 9 - 2x + 4$$

$$5x - 5$$

Example 11: For the given functions f and g , find the indicated composition.

11) $f(x) = -4x + 8$, $g(x) = 3x + 5$

$$\begin{aligned} (g \circ f)(x) &= g(f(x)) \\ &= 3(-4x + 8) + 5 \\ &= -12x + 24 + 5 \\ &= -12x + 29 \end{aligned}$$

11) $-12x + 29$

Example 12: Find the inverse of the one-to-one function.

12) $f(x) = \frac{5}{7x - 8}$

$$(7y - 8) \cdot x = \frac{5}{7y - 8} \cdot (7y - 8)$$

$$\frac{x(7y - 8)}{x} = \frac{5}{x}$$

$$7y - 8 = \frac{5}{x}$$

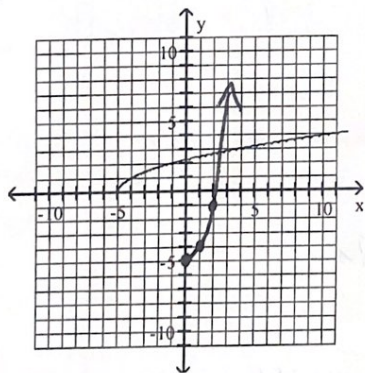
$$7y = \frac{5}{x} + 8$$

$$y = \frac{5}{7x} + \frac{8}{7}$$

12) $y = \frac{5}{7x} + \frac{8}{7}$

Example 13: Use the graph of f to draw the graph of its inverse function.

13)



x	y
-5	0
-4	1
-1	2

Inverse

x	y
0	-5
1	-4
2	-1

13) Graph

Example 14: Determine which two functions are inverses of each other.

14) $f(x) = 3x$, $g(x) = \frac{x}{3}$, $h(x) = \frac{3}{x}$

$$\begin{aligned} x &= 3y \\ \frac{x}{3} &= y \end{aligned}$$

$$\begin{aligned} x &= \frac{3}{y} \\ xy &= \frac{3}{x} \\ x &= \frac{3}{x} \\ y &= \frac{3}{x} \end{aligned}$$

14) $f(x) \circ g(x)$

Example 15-17: Solve the problem.

- 15) A car rental agency charges \$150 per week plus \$0.35 per mile to rent a car. How many miles were driven during the week if the weekly cost to rent the car was \$332?

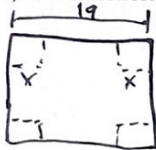
15) 520 miles

$$C(m) = 150 + 0.35m \quad 182 = 0.35m$$

$$332 = 150 + 0.35m \quad m = 520$$

- 16) An open box is made from a square piece of sheet metal 19 inches on a side by cutting identical squares from the corners and turning up the sides. Express the volume of the box, V , as a function of the length of the side of the square cut from each corner, x .

16) $4x^3 - 76x^2 + 361x$



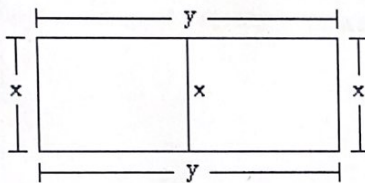
$$V = L \cdot w \cdot h$$

$$V = (19 - 2x)(19 - 2x)x$$

$$V = (361 - 76x + 4x^2)x$$

- 17) The area of a rectangular garden is 225 square feet. The garden is to be enclosed by a stone wall costing \$24 per linear foot. The interior wall is to be constructed with brick costing \$9 per linear foot. Express the cost C , to enclose the garden and add the interior wall as a function of x .

17) _____



$$A = 225 \text{ ft}^2 \quad C = 24(2x) + 24(2y) + 9x$$

$$A = xy \quad C = 24(2x + 2y) + 9x$$

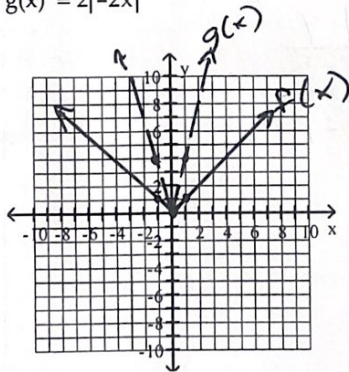
$$225 = xy \quad C = 24(2x + 2(\frac{225}{x})) + 9x$$

$$y = \frac{225}{x} \quad C = 9x + 24(2x + \frac{450}{x})$$

Example 18: Begin by graphing the standard absolute value function $f(x) = |x|$. Then use transformations of this graph to graph the given function.

18) $g(x) = 2|-2x|$

18) _____



x	y
-1	1
0	0
1	1

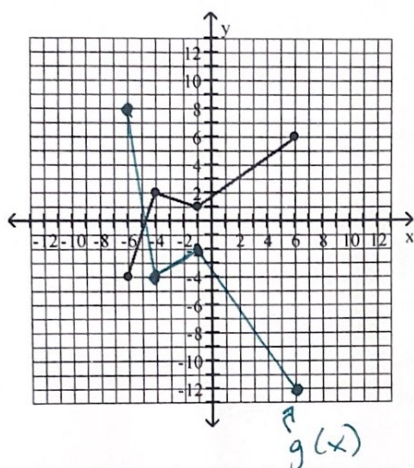
$$g(x) = 2|-2x|$$

x	y
-1	$2 -2 \cdot -1 = 4$
0	0
1	4

Example 19: Use the graph of $y = f(x)$ to graph the given function g .

19) $g(x) = -2f(x)$

19) Graph

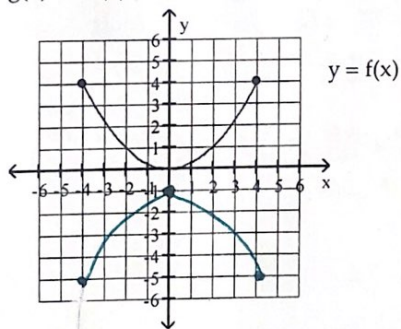


$g(x)$	
x	y
-6	$-4 \cdot -2 = 8$
-4	$2 \cdot -2 = -4$
-2	$1 \cdot -2 = -2$
0	$1 \cdot -2 = -2$
2	$4 \cdot -2 = -8$
4	$6 \cdot -2 = -12$

Example 20: Use the graph of the function f , plotted with a solid line, to sketch the graph of the given function g .

20) $g(x) = -f(x) - 1$

20) Graph



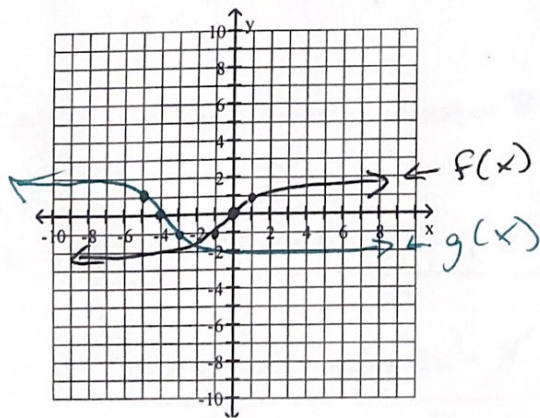
$g(x)$	
x	y
-4	$4 \cdot -1 - 1 = -5$ Reflected
0	$0 \cdot -1 - 1 = -1$ ↓ 1
4	$4 \cdot -1 - 1 = -5$

Example 21: Begin by graphing the cube root function $f(x) = \sqrt[3]{x}$. Then use transformations of this graph to graph the given function.

21) $g(x) = -\sqrt[3]{x+4}$

$a\sqrt[3]{x-h}+k$

21) Graph



$g(x)$ - reflected
← 4