1 Chapter Review

FREQUENTLY ASKED Questions

Study Aid

- See Lesson 1.4, Examples 2, 3, and 4.
- Try Chapter Review Questions 7, 8, and 9.

Q: In what order are transformations performed on a function?

Function → Perform all stretches/compressions and reflections. → Perform all translations.

A: All stretches/compressions (vertical and horizontal) and reflections can be applied at the same time by multiplying the *x*- and *y*-coordinates on the parent function by the appropriate factors. Both vertical and horizontal translations can then be applied by adding or subtracting the relevant numbers to the *x*- and *y*-coordinates of the points.

Study Aid

- See Lesson 1.5, Examples 1, 2, and 3.
- Try Chapter Review Questions 10 to 13.

Q: How do you find the inverse relation of a function?

A: You can find the inverse relation of a function numerically, graphically, or algebraically.

To find the inverse relation of a function numerically, using a table of values, switch the values for the independent and dependent variables.

$f(x)$	f^{-1}
(x, y)	(y, x)

To find the inverse relation graphically, reflect the graph of the function in the line $y = x$. This is accomplished by switching the *x*- and *y*-coordinates in each ordered pair.

To find the algebraic representation of the inverse relation, interchange the positions of the *x*- and *y*-variables in the function and solve for *y*.

Q: Is an inverse of a function always a function?

A: No; if an element in the domain of the original function corresponds to more than one number in the range, then the inverse relation is not a function.

Study Aid

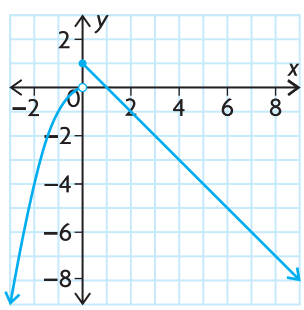
- See Lesson 1.5, Examples 1, 2, and 3.
- Try Chapter Review Questions 10 to 13.

Q: What is a piecewise function?

A: A piecewise function is a function that has two or more function rules for different parts of its domain.

For example, the function defined by $f(x) = \begin{cases} -x^2, \text{ if } x < 0 \\ -x + 1, \text{ if } x \geq 0 \end{cases}$

consists of two pieces. The first equation defines half of a parabola that opens down when $x < 0$. The second equation defines a decreasing line with a y-intercept of 1 when $x \geq 0$. The graph confirms this.



Study Aid

- See Lesson 1.6, Examples 1, 2, 3, and 4.
- Try Chapter Review Questions 14 to 17.

Q: If you are given the graphs or equations of two functions, how can you create a new function?

A: You can create a new function by adding, subtracting, or multiplying the two given functions.

This can be done graphically by adding, subtracting, or multiplying the y-coordinates in each pair of ordered pairs that have identical x-coordinates.

This can be done algebraically by adding, subtracting, or multiplying the expressions for the dependent variable and then simplifying.

Study Aid

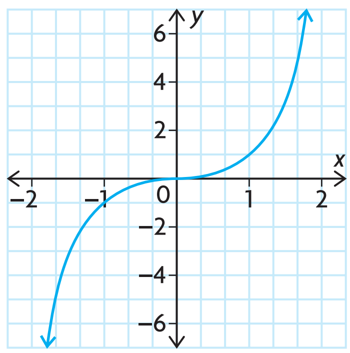
- See Lesson 1.7.
- Try Chapter Review Questions 18 to 21.

PRACTICE Questions

Lesson 1.1

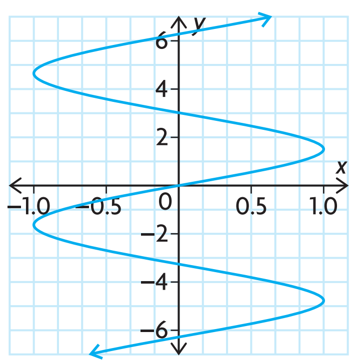
1. Determine whether each relation is a function, and state its domain and range.

a)



b) $3x^2 + 2y = 6$

c)



d) $x = 2^y$

2. A cell phone company charges a monthly fee of \$30, plus \$0.02 per minute of call time.

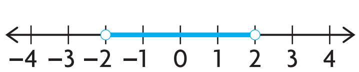
a) Write the monthly cost function, $C(t)$, where t is the amount of time in minutes of call time during a month.

b) Find the domain and range of C.

Lesson 1.2

3. Graph $f(x) = 2|x + 3| - 1$, and state the domain and range.

4. Describe this interval using absolute value notation.



Lesson 1.3

5. For each pair of functions, give a characteristic that the two functions have in common and a characteristic that distinguishes them.

a) $f(x) = x^2$ and $g(x) = \sin x$

b) $f(x) = \dfrac{1}{x}$ and $g(x) = x$

c) $f(x) = |x|$ and $g(x) = x^2$

d) $f(x) = 2^x$ and $g(x) = x$

6. Identify the intervals of increase/decrease, the symmetry, and the domain and range of each function.

a) $f(x) = 3x$

b) $f(x) = x^2 + 2$

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

Lesson 1.4

7. For each of the following equations, state the parent function and the transformations that were applied. Graph the transformed function.

a) $y = |x + 1|$

b) $y = -0.25\sqrt{3(x + 7)}$

c) $y = -2\sin(3x) + 1,\ 0 \le x \le 360°$

d) $y = 2^{-2x} - 3$

8. The graph of $y = x^2$ is horizontally stretched by a factor of 2, reflected in the x-axis, and shifted 3 units down. Find the equation that results from the transformation, and graph it.

9. (2, 1) is a point on the graph of $y = f(x)$. Find the corresponding point on the graph of each of the following functions.

a) $y = -f(-x) + 2$

b) $y = f(-2(x + 9)) - 7$

c) $y = f(x - 2) + 2$

d) $y = 0.3f(5(x - 3))$

e) $y = 1 - f(1 - x)$

f) $y = -f(2(x - 8))$

Lesson 1.5

10. For each point on a function, state the corresponding point on the inverse relation.

a) $(1, 2)$
b) $(-1, -9)$
c) $(0, 7)$
d) $f(5) = 7$
e) $g(0) = -3$
f) $h(1) = 10$

11. Given the domain and range of a function, state the domain and range of the inverse relation.

a) $D = \{x \in \mathbf{R}\}$, $R = \{y \in \mathbf{R} \mid -2 < y < 2\}$
b) $D = \{x \in \mathbf{R} \mid x \geq 7\}$, $R = \{y \in \mathbf{R} \mid y < 12\}$

12. Graph each function and its inverse relation on the same set of axes. Determine whether the inverse relation is a function.

a) $f(x) = x^2 - 4$
b) $g(x) = 2^x$

13. Find the inverse of each function.

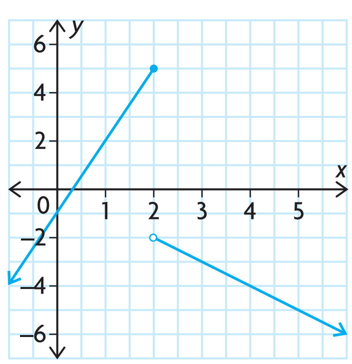
a) $f(x) = 2x + 1$
b) $g(x) = x^3$

Lesson 1.6

14. Graph the following function. Determine whether it is discontinuous and, if so, where. State the domain and the range of the function.

$$f(x) = \begin{cases} 2x, \text{ if } x < 1 \\ x + 1, \text{ if } x \geq 1 \end{cases}$$

15. Write the algebraic representation for the following piecewise function, using function notation.



16. If $f(x) = \begin{cases} x^2 + 1, \text{ if } x < 1 \\ 3x, \text{ if } x \geq 1 \end{cases}$

is $f(x)$ continuous at $x = 1$? Explain.

17. A telephone company charges $30 a month and gives the customer 200 free call minutes. After the 200 min, the company charges $0.03 a minute.

a) Write the function using function notation.
b) Find the cost for talking 350 min in a month.
c) Find the cost for talking 180 min in a month.

Lesson 1.7

18. Given $f = \{(0, 6), (1, 3), (4, 7), (5, 8)\}$ and $g = \{(-1, 2), (1, 4), (2, 3), (4, 8), (8, 9)\}$, determine the following.

a) $f(x) + g(x)$
b) $f(x) - g(x)$
c) $[f(x)][g(x)]$

19. Given $f(x) = 2x^2 - 2x$, $-2 \leq x \leq 3$ and $g(x) = -4x$, $-3 \leq x \leq 5$, graph the following.

a) f
b) g
c) $f + g$
d) $f - g$
e) fg

20. $f(x) = x^2 + 2x$ and $g(x) = x + 1$. Match the answer with the operation.

Answer:	Operation:
a) $x^3 + 3x^2 + 2x$	A $f(x) + g(x)$
b) $-x^2 - x + 1$	B $f(x) - g(x)$
c) $x^2 + 3x + 1$	C $g(x) - f(x)$
d) $x^2 + x - 1$	D $f(x) \times g(x)$

21. $f(x) = x^3 + 2x^2$ and $g(x) = -x + 6$,

a) Complete the table.

x	−3	−2	−1	0	1	2
$f(x)$						
$g(x)$						
$(f + g)(x)$						

b) Use the table to graph $f(x)$ and $g(x)$ on the same axes.
c) Graph $(f + g)(x)$ on the same axes as part b).
d) State the equation of $(f + g)(x)$.
e) Verify the equation of $(f + g)(x)$ using two of the ordered pairs in the table.