Functions Modeling Change A Preparation for Calculus 6th edition Connally Test Bank

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1. $A = f(s) = s^2$ is the area of a square of side length s. What does $f(36)$ mean in terms of the square?
   A) $f(36) = 1296$, the area of a square of side length 36.
   B) $f(36) = 6$, the area of a square of side length 6.
   C) $f(36) = 1296$, the area of a square of side length 1296.
   D) $f(36) = 6$, the area of a square of side length 6.
   Ans: A Learning Objective: Given a function, find the output value corresponding to a given input value using algebra difficulty: easy

2. $A = f(s) = s^2$ is the area of a square of side length s. What does $f(s) = 16$ mean in terms of the square?
   A) $s = 256$, the side length of a square with area 16.
   B) $s = 4$, the side length of a square with area 16.
   C) $s = 16$, the side length of a square with area 256.
   D) $s = 4$, the side length of a square with area 256.
   Ans: B Learning Objective: Given a function, find the output value corresponding to a given input value using algebra difficulty: easy

3. Evaluate $f(x) = x^2 + 5x + 4$ for $x = -3$.
   Ans: -2
   Learning Objective: Given a function, find the output value corresponding to a given input value using algebra difficulty: easy

4. Solve $f(x) = \sqrt{x+6} = 5$ for x.
   Ans: 19
   Learning Objective: Given a function, find input values corresponding to a given output value using algebra. difficulty: easy

5. If $f(x) = \dfrac{1}{x+6} + 5$, find $f(-1)$ to 2 decimal places.
   Ans: 5.20
   Learning Objective: Given a function, find the output value corresponding to a given input value using algebra difficulty: easy

6. If $f(x) = \dfrac{1}{x+5} + 2$, solve $f(x) = 0$ for x. Rounded to 2 decimal places.
   Ans: -5.5
   Learning Objective: Given a function, find input values corresponding to a given output value using algebra. difficulty: medium

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7. Suppose that your uncle Gerald has just opened a store that sells television sets. Let $P(x)$ represent the profit that he makes selling x television sets per week. Suppose that he currently sells k television sets per week. What is the practical interpretation of $P(2k)$?

A) Twice the profit he currently makes.
B) The number of additional television sets he would have to sell per week to obtain twice the profit.
C) The profit he would make if he sold twice as many television sets per week than he currently sells.
D) Twice the number of television sets he currently sells.

Ans: C Learning Objective: Find input and output values of a function represented algebraically, as a graph or as a table. difficulty: medium

8. Given $g(x) = 4x^2 - 5x$, what is $g(5-x)$?

A) $-4x^2 + 35x - 75$
B) $-4x^2 - 35x + 75$
C) $4x^2 + 35x - 75$
D) $4x^2 - 35x + 75$

Ans: D Learning Objective: Given a function, find the output value corresponding to a given input value using algebra difficulty: medium

9. For $f(x) = x^2 - 8x + 5$, what is $f(-1)$?

Ans: 14
Learning Objective: Given a function, find the output value corresponding to a given input value using algebra difficulty: easy

10. For $f(x) = x^2 - 4x + 5$, what is $f(x+4)$?

A) $x^2 + 12x - 37$
B) $x^2 - 12x - 37$
C) $x^2 - 4x + 5$
D) $x^2 + 4x + 5$

Ans: D Learning Objective: Given a function, find the output value corresponding to a given input value using algebra difficulty: medium

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11. Let $w(m)$ give the weight (in pounds) of an average-sized baby girl who is m months old. What does it mean if $w(5)=14$?

A) 14 baby girls weight 5 pounds.
B) 5 baby girls weight 14 pounds.
C) An average 14-month old girl weighs 5 pounds.
D) An average 5-month old girl weighs 14 pounds.

Ans: D Learning Objective: Given a function, find the output value corresponding to a given input value using algebra difficulty: easy

12. Let $w(m)$ give the weight (in pounds) of an average-sized baby girl who is m months old. What does the statement $w(p)=17$ mean?

A) The average p-month old girl weighs 17 pounds.
B) The average 17-month old girl weighs p pounds.
C) There are p baby girls weighing 17 pounds.
D) There are 17 baby girls weighing p pounds.

Ans: A Learning Objective: Given a function, find input values corresponding to a given output value using algebra. difficulty: medium

13. Find the y-coordinate of the point on the graph of $y=h(x)=\dfrac{1}{\sqrt{x+3}}$ whose x-coordinate is 1.

Ans: 0.5
Learning Objective: Given a function, find the output value corresponding to a given input value using algebra difficulty: medium

14. The circumference, in cm, of a circle whose radius is r cm is given by $C=2\pi r$. If $C=f(r)$, evaluate and interpret $f(r+6)$.

A) $2\pi r+6$, the circumference of a circle of radius $r + 6$.
B) $2\pi r+6$, 6 more than the circumference of a circle of radius r.
C) $2\pi r+12\pi$, the circumference of a circle of radius $r + 6$.
D) $2\pi r+12$, 12 more than the circumference of a circle of radius r.

Ans: C Learning Objective: Given a function, find the output value corresponding to a given input value using algebra difficulty: medium

15. The circumference, in cm, of a circle whose radius is r cm is given by $C=2\pi r$. If $C=f(r)$, evaluate and interpret $f(r)+5$.

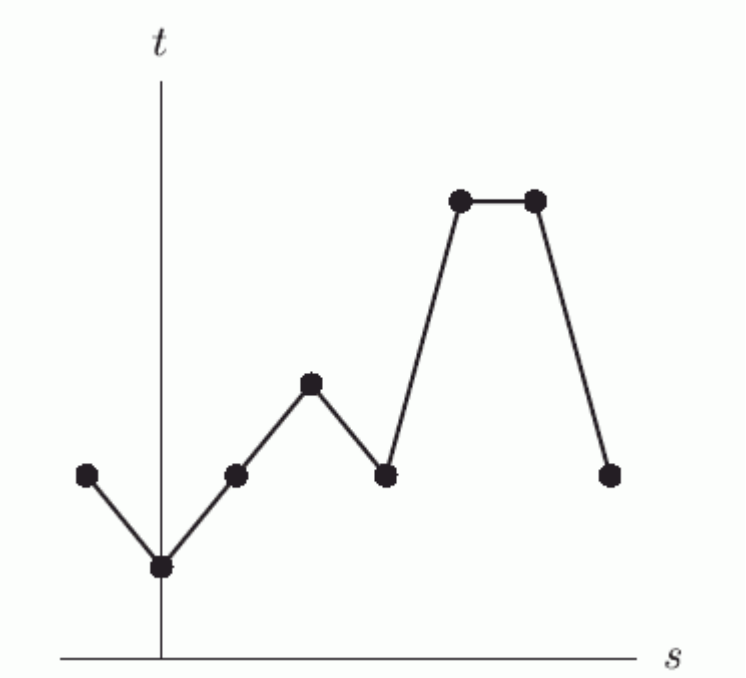
A) $2\pi r+5$, the circumference of a circle of radius $r + 5$.
B) $2\pi r+5$, 5 more than the circumference of a circle of radius r.
C) $2\pi r+10\pi$, the circumference of a circle of radius $r + 5$.
D) $2\pi r+10\pi$, 5 more than the circumference of a circle of radius r.

Ans: B Learning Objective: Given a function, find the output value corresponding to a given input value using algebra difficulty: medium

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16. The data points for the following table are graphed in the figure below.

s	-1	0	1	2	3	4	5	6
t	2	1	2	3	2	5	5	2

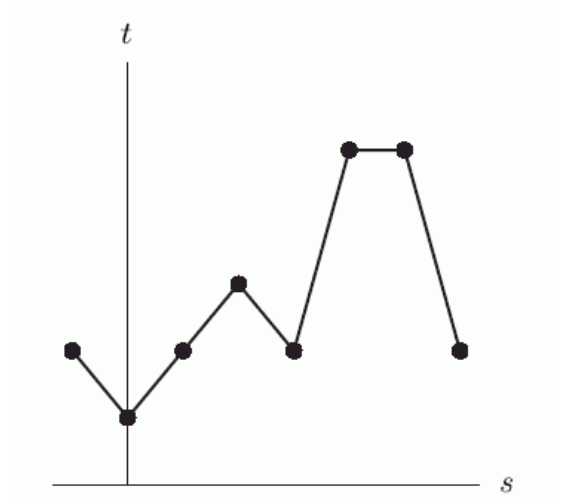


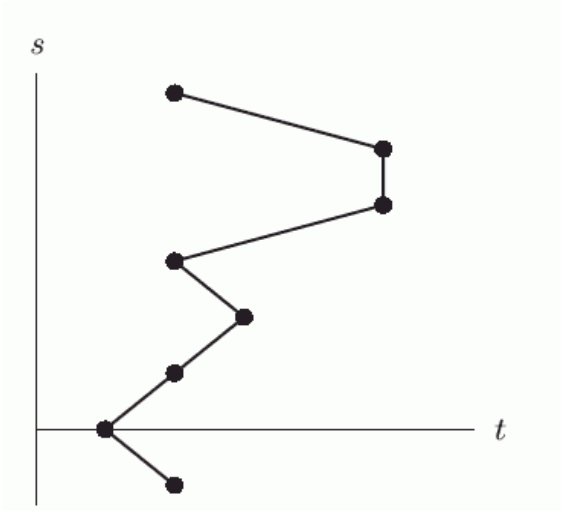
Is this the graph of a function?
Ans: yes
Learning Objective: Given a function, find output and input values using tables and graphs. difficulty: easy

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17. The data points for the following table are graphed in the figures below.

s	-1	0	1	2	3	4	5	6
t	2	1	2	3	2	5	5	2



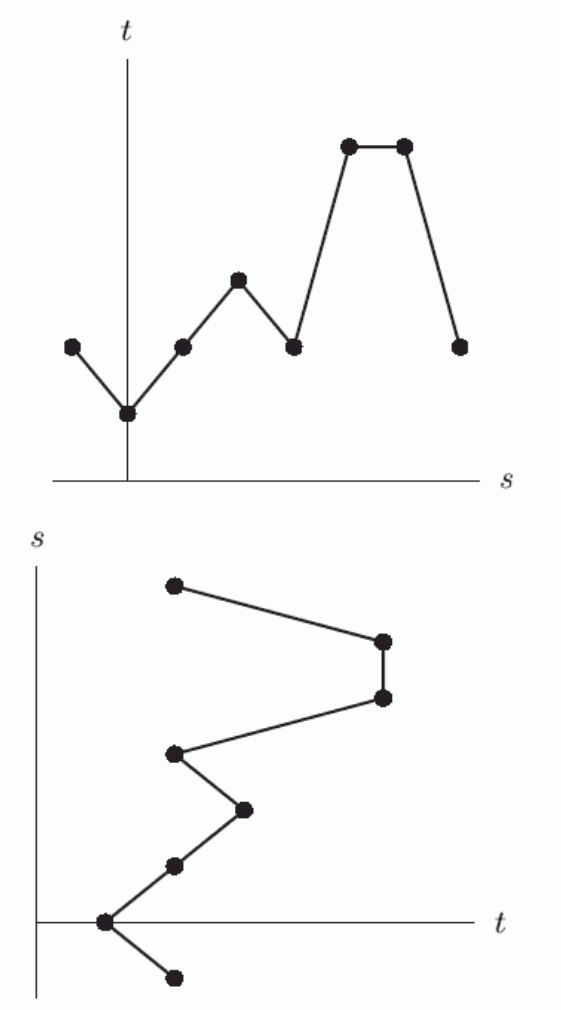


For the graph that is a function, we could write _____ = f (_____), where _____ is the dependent variable and _____ is the independent variable. (Fill in each blank with an "s" or a "t").
Part A: t
Part B: s
Part C: t
Part D: s
Learning Objective: Given a function, find output and input values using tables and graphs. difficulty: medium

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18. The data points for the following table are graphed in the figure below.

s	-1	0	1	2	3	4	5	6
t	2	1	2	3	2	5	5	2

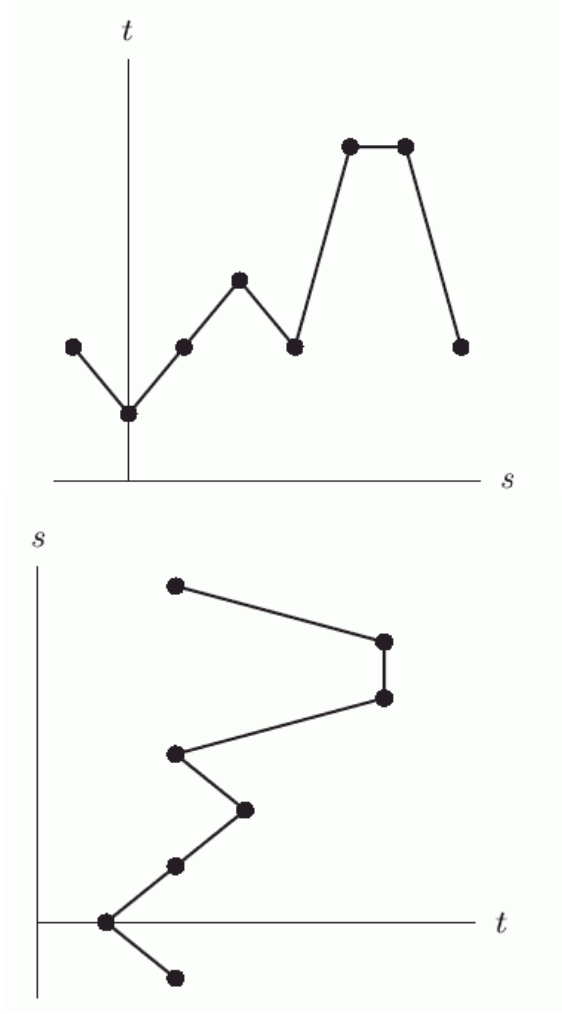


For the graph that is a function, approximate $f(-0.5)$.
Ans: 1.5
Learning Objective: Given a function, find output and input values using tables and graphs. difficulty: medium

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19. The data points for the following table are graphed in the figure below.

s	-1	0	1	2	3	4	5	6
t	2	1	2	3	2	5	5	2

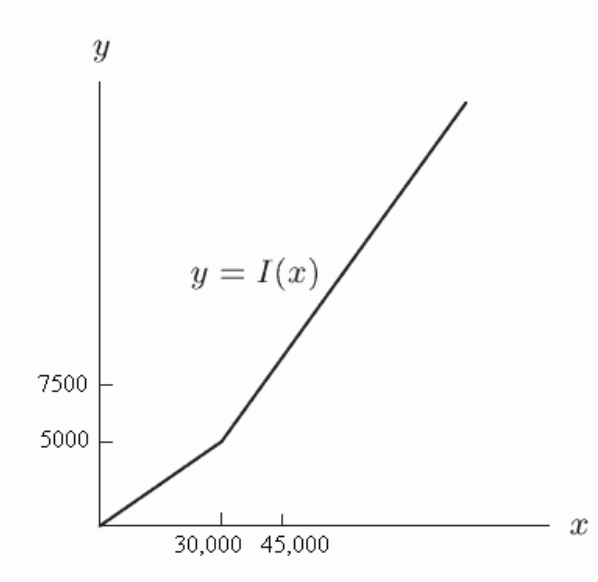


For the graph that is a function, what is its domain?
A) $-1 \leq s \leq 6$
B) $1 \leq t \leq 5$
Ans: A Learning Objective: Given a function, find output and input values using tables and graphs. difficulty: medium

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20. Let $w(m)$ give the weight (in pounds) of an average-sized baby girl who is m months old. A 16-month old baby named Amelia weighs $w(19)$ pounds. What does this tell you?
    A) She is below average weight.
    B) She is above average weight.
    C) She is about average weight.
    Ans: B Learning Objective: Given a function, find the output value corresponding to a given input value using algebra difficulty: medium

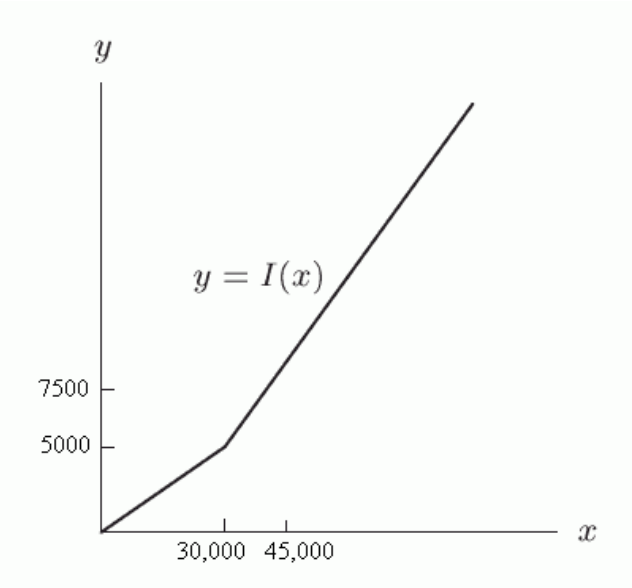
21. Let $I(x)$ be the federal income tax paid based on a total taxable income of x dollars. The value of $I(x)$ is approximated by the graph in the following figure. Which of the following would represent a decrease in your income tax if your income was w dollars?



    A) $I(w-300)$
    B) $I(w)+1000$
    C) $I(w+300)$
    D) $I(w)-1000$
    Ans: A, D Learning Objective: Given a function, find output and input values using tables and graphs. difficulty: medium

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22. Let $I(x)$ be the federal income tax paid based on a total taxable income of x dollars. The value of $I(x)$ is approximated by the graph in the following figure. In this context, which of the following is greater?



A) $I(x+800)$
B) $I(x)+800$
Ans: B Learning Objective: Find input and output values of a function represented algebraically, as a graph or as a table. difficulty: medium

23. Assume that height is a function of age and that $H = f(a)$ is the average height (in inches) for females in the US at age a years. What is the practical interpretation of $f(20)$?
A) The number of US females who are 20 years old.
B) The number of US females who are 20 inches tall.
C) The average height of a US female who is 20 years old.
D) The average age of a US female who is 20 inches tall.
Ans: C Learning Objective: Find input and output values of a function represented algebraically, as a graph or as a table. difficulty: easy

24. Assume that height is a function of age and that $H = f(a)$ is the average height (in inches) for females in the US at age a years. What is the practical interpretation of $f(z)+10$?
A) z plus the number of US females who are 10 inches tall.
B) 10 plus the number of US females who are z inches tall.
C) 10 years older than the average US female who is z inches tall.
D) 10 inches taller than the average height of a z year old US female.
Ans: D Learning Objective: Find input and output values of a function represented algebraically, as a graph or as a table. difficulty: medium

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25. For $f(x) = x^2 - 3x + 4$, what is $f\left(\frac{1}{x-2}\right)$?

A) $\frac{4x^2 - 19x + 23}{x^2 - 4x + 4}$

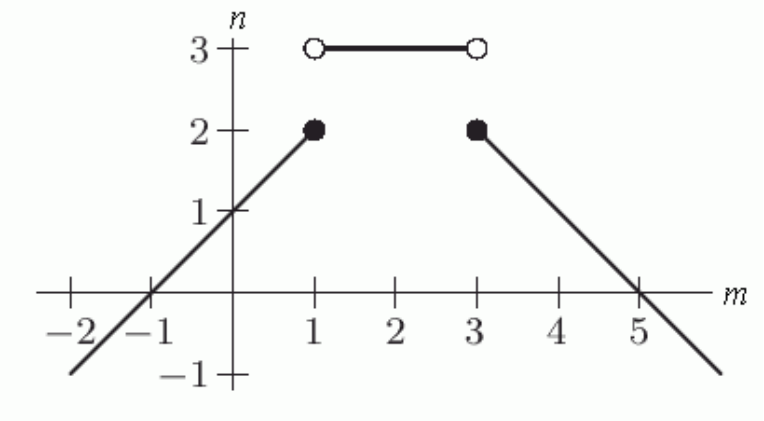
B) $\frac{4x^2 - 19x - 9}{x^2 - 4x + 4}$

C) $\frac{4x^2 - 13x - 9}{x^2 - 4x + 4}$

D) $\frac{4x^2 - 13x + 11}{x^2 - 4x + 4}$

Ans: A Learning Objective: Given a function, find the output value corresponding to a given input value using algebra difficulty: hard

26. In the following graph, is n a function of m?



Ans: yes
Learning Objective: Given a function, find output and input values using tables and graphs. difficulty: medium

27. A supermarket only sells cans of soda in 6-packs. The price of a 6-pack is \$1.55. Let $C(x)$ be the total cost if you need x cans of soda. What is $C(55)$?

Ans: \$15.50
Learning Objective: Find input and output values of a function represented algebraically, as a graph or as a table. difficulty: medium

28. Let $f(x) = \frac{3x+9}{2x+1}$. For what value of x is $f(x) = 3$?

Ans: 2
Learning Objective: Given a function, find the output value corresponding to a given input value using algebra difficulty: medium

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29. Let $f(x) = 2x^2 - 5$. For what value of x is $f(x) = 27$?
Ans: 4
Learning Objective: Given a function, find the output value corresponding to a given input value using algebra difficulty: easy

30. If $f(x) = -3x - 6$, evaluate the expression $3f(-1) - f(5)$.
Ans: 12
Learning Objective: Given a function, find the output value corresponding to a given input value using algebra difficulty: easy

31. Let $f(x) = \frac{x}{3} + 3$. Complete the table.

x		-3		6
$f(x)$	1		4	

Ans:

x	-6	-3	3	6
$f(x)$	1	2	4	5

Learning Objective: Given a function, find input values corresponding to a given output value using algebra. difficulty: easy

Functions Modeling Change A Preparation for Calculus 6th edition Connally Test Bank

1. What is the domain of $y = h(x) = \dfrac{4}{\sqrt{x+a}}$, where a is a constant?

   A) $y > 0$
   B) $x > -a$
   C) $y > 4$
   D) $x > a$
   Ans: B Learning Objective: Determine the domain and range of a function using a formula. difficulty: medium

2. Let $f(x) = \dfrac{2}{x+|x|}$. What is the domain of $f(x)$?

   A) $f(x) > 2$
   B) $f(x) < 2$
   C) $x < 0$
   D) $x > 0$
   Ans: D Learning Objective: Determine the domain and range of a function using a formula. difficulty: medium

3. Assume that height is a function of age and that $H = f(a)$ is the average height (in inches) for females in the US at age a years. What is a reasonable domain for $H = f(a)$?

   A) $0 \le a \le 100$
   B) $0 \le H \le 100$
   C) $18 \le a \le 68$
   D) $18 \le H \le 68$
   Ans: A Learning Objective: Determine the domain and range of a function using a real-world context. difficulty: medium

4. Which of the following are *not* in the domain of $r(x) = \dfrac{1}{(x+4)^2} + \sqrt{3-x}$?

   A) $x = 4$
   B) $x = -4$
   C) $x = 3$
   D) All numbers x such that $x > 3$
   E) All numbers x such that $x < 3$
   Ans: A, B, D Learning Objective: Determine the domain and range of a function using a formula. difficulty: medium

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5. Which of the following are *not* in the range of $y = \dfrac{6-3x}{7+x}$?

A) $y = 2$
B) $y = -7$
C) $y = -3$
D) All numbers y such that $y > -7$
E) All numbers y such that $y < -7$

Ans: C Learning Objective: Determine the domain and range of a function using a formula. difficulty: medium

6. What is the domain of the function $f(x) = \dfrac{10}{\sqrt{1-x^2}}$?

A) $-10 < x < 10$
B) $-10 \le x \le 10$
C) $-1 < x < 1$
D) $-1 \le x \le 1$

Ans: C Learning Objective: Determine the domain and range of a function using a formula. difficulty: medium

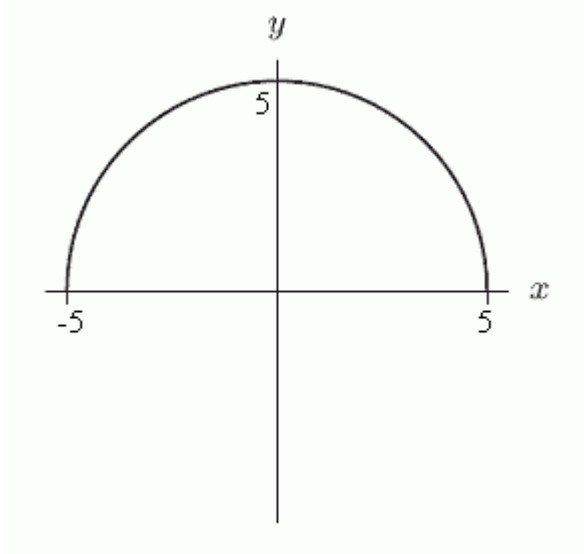
7. What is the range of the function $y = \dfrac{14}{\sqrt{4-x^2}}$?

A) $y \ge 2$
B) $y \le 2$
C) $y \ge 14$
D) $y \le 14$
E) $y \ge 7$
F) $y \le 7$

Ans: E Learning Objective: Determine the domain and range of a function using a formula. difficulty: medium

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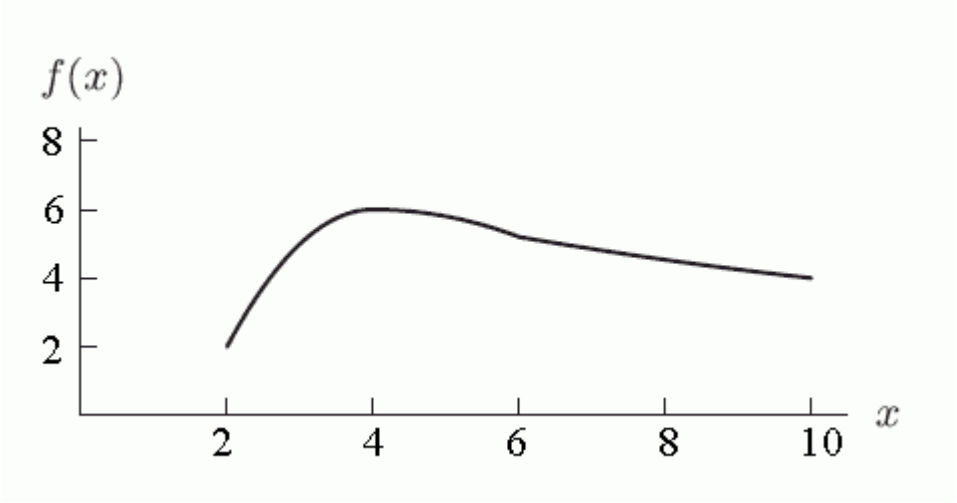
8. The graph of $g(x)=\sqrt{25-x^2}$ is shown below. What is the range of $g(x)$?



A) $0 \le y \le 5$
B) $y \le 5$
C) $y \ge 0$
D) $-5 \le y \le 5$

Ans: A Learning Objective: Determine the domain and range of a function using a graph. difficulty: medium

9. Assuming the entire graph of $f(x)$ is shown, what is the domain of $f(x)$?



A) $2 \le x \le 6$
B) $2 \le x \le 10$
C) $2 \le y \le 6$
D) $2 \le y \le 10$

Ans: B Learning Objective: Determine the domain and range of a function using a graph. difficulty: medium

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10. Given the domain $-1 \le x \le 5$, the range of $f(x) = x^2 - 1$ is _____ $\le y \le$ _____.
Part A: –1
Part B: 24
Learning Objective: Determine the domain and range of a function using a formula.
difficulty: hard

11. An organization has 175 raffle tickets to sell for $5 each. From the proceeds of the sale, they will award the winning ticket holder $100. The profit, *P*, that the organization receives is a function of the number, *n*, of tickets sold. Assuming they sell at least one ticket, the range of this function is _____ $\le$ _____ $\le$ _____.
Part A: –95
Part B: *P*
Part C: 775
Learning Objective: Determine the domain and range of a function using a real-world context. difficulty: medium

12. A model rocket is launched from the roof of a building. For height *h*, in meters, and time *t*, in seconds, after the rocket is launched, the height of the rocket above the ground is given by $h = f(t) = -4.9t^2 + 47t + 18$. The range of this function is approximately _____ $\le h \le$ _____. Round to the nearest whole number.
Part A: 18
Part B: 131
Learning Objective: Determine the domain and range of a function using a real-world context. difficulty: hard

13. A model rocket is launched from the roof of a building. For height *h*, in meters, and time *t*, in seconds, after the rocket is launched, the height of the rocket above the ground is given by $h = f(t) = -4.9t^2 + 43t + 21$. Interpret the domain of the graph of $f(t)$.
A) The time it takes for the rocket to hit the ground
B) The rocket's initial height
C) The heights the rocket reaches
D) The time the rocket is in the air
E) The maximum height obtained by the rocket.
Ans: D Learning Objective: Determine the domain and range of a function using a real-world context. difficulty: medium

14. Given the following table of values, can you conclude that $f(x) = g(x)$?

x	0	1	2	3	4	5
$f(x)$	10	11	13	16	20	25
$g(x)$	10	11	13	16	20	25

Ans: no
Learning Objective: Determine the domain and range of a function using a graph.
difficulty: medium

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15. A supermarket only sells cans of soda in 6-packs. The price of a 6-pack is \$1.85. Let $C(x)$ be the total cost if you need x cans of soda. What is the range of $C(x)$?

A) All nonnegative multiples of 6.
B) All nonnegative multiples of 1.85.
C) All nonnegative multiples of 1.85*6.
D) All real numbers.

Ans: B Learning Objective: Determine the domain and range of a function using a real-world context. difficulty: medium

16. Find the domain and range of the function $f(x) = \dfrac{-2}{\sqrt{x-8}}$

Ans: Domain : $x > 8$
Range : $y < 0$
Learning Objective: Determine the domain and range of a function using a formula.
difficulty: medium

17. Find the domain of the function $h(x) = \dfrac{2}{x^2 - 25}$.

Ans: All real numbers except 5 and -5.
Learning Objective: Determine the domain and range of a function using a formula.
difficulty: hard

18. Find the domain and range of the function $h(x) = \dfrac{-3}{x^2 + 4}$

Ans: Domain : All real numbers.
Range : $\dfrac{-3}{4} \le y < 0$
Learning Objective: Determine the domain and range of a function using a formula.
difficulty: hard

19. Find the domain of the function $g(x) = \sqrt{\dfrac{3x}{x-5}}$.

Ans: All real numbers x such that $x \le 0$ or $x > 5$.
Learning Objective: Determine the domain and range of a function using a formula.
difficulty: medium

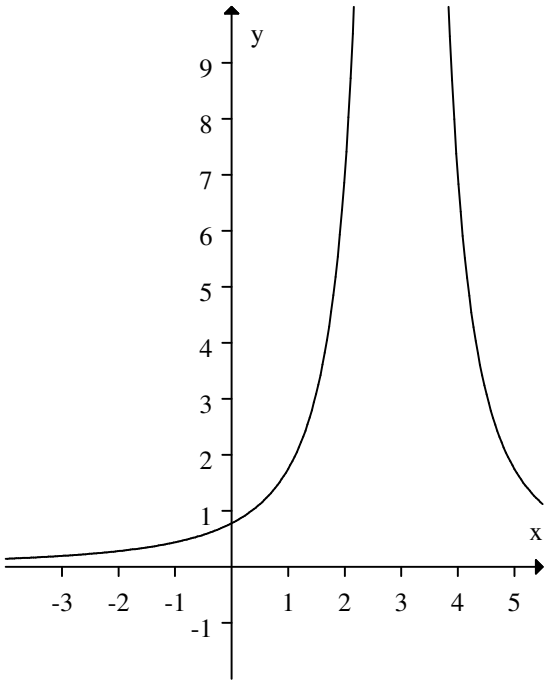
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20. Let $f(x)=\dfrac{7}{(x-3)^2}$.

a) Graph $f(x)$.

b) Use the graph to find the range of the function on the domain $[-2,4]$.

Part A:



Part B: $f(x)\geq\dfrac{7}{25}$

Learning Objective: Determine the domain and range of a function using a graph.
difficulty: medium

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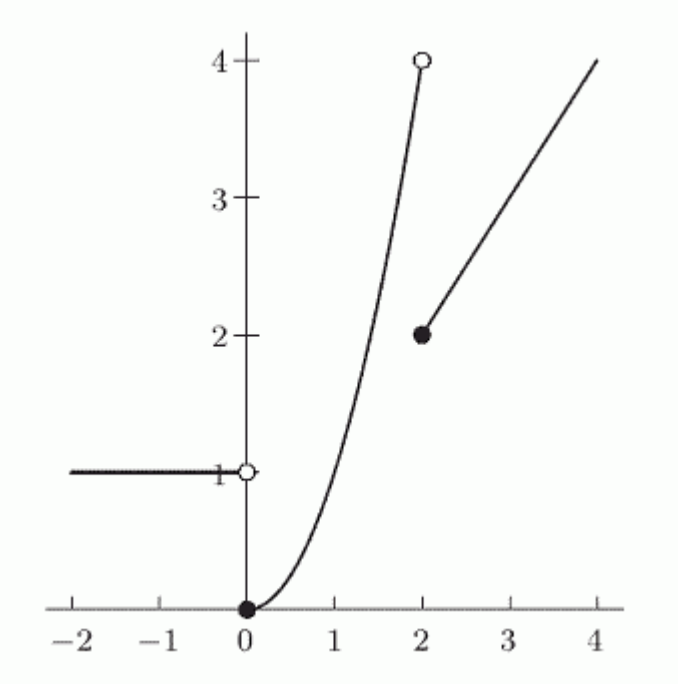
1. Which of the following is the range of the function $P = g(x) = \begin{cases} -x+6, & x \le -2 \\ 8, & -2 < x \le 3 \\ x+5, & x > 3 \end{cases}$?

A) $P \ge 8$
B) $-8 \le P \le 8$
C) $P \ge -8$
D) all real numbers
Ans: A Learning Objective: Find a formula for, graph, interpret, and evaluate a piecewise function. difficulty: medium

2. Evaluate $h(0)$ if $h(x) = \begin{cases} 3x+6, & x \le -2 \\ -x^2+4, & x > -2 \end{cases}$

Ans: 4
Learning Objective: Compute values and sketch the graph of a piecewise-defined function. difficulty: medium

3. Does the following figure show an accurate graph of $f(x) = \begin{cases} 1, & -2 \le x < 0 \\ x^2, & 0 \le x < 2 \\ x, & 2 \le x \le 4 \end{cases}$?



Ans: yes
Learning Objective: Compute values and sketch the graph of a piecewise-defined function. difficulty: medium

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4. ComGas, the Cambridge power company, charges its customers \$6.78 a month, plus an additional \$1.00 per therm up to 32 therms and \$0.66 per therm above 32 therms. (A therm is a unit of gas supplied.) Let $C(x)$ be the monthly cost in dollars for using x therms. Which of the following is the formula for C?

A) $$C(x)=\begin{cases}6.78+1.00x, & 0\le x\le 32\\ 6.78+0.66x, & x>32\end{cases}$$

B) $$C(x)=\begin{cases}6.78+1.00x, & 0\le x\le 32\\ 38.78+0.66x, & x>32\end{cases}$$

C) $$C(x)=\begin{cases}6.78+1.00x, & 0\le x\le 32\\ 6.78+0.66(x-32), & x>32\end{cases}$$

D) $$C(x)=\begin{cases}6.78+1.00x, & 0\le x\le 32\\ 38.78+0.66(x-32), & x>32\end{cases}$$

Ans: D Learning Objective: Write a formula for a piecewise-defined function. difficulty: medium

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5. A T-shirt printing company charges a set-up fee of $15 for each order, plus the cost per shirt shown in the table.

# of shirts	cost per shirt
0-10	$12
11-20	$11
21-30	$10
over 30	$9

Let C be the total cost in dollars for printing n shirts. Which of the following is the formula for C?

A) $$C = \begin{cases} 15+12n, & 0 \le n \le 10 \\ 15+11n, & 10 < n \le 20 \\ 15+10n, & 20 < n \le 30 \\ 15+9n, & n > 30 \end{cases}$$

B) $$C = \begin{cases} 27n, & 0 \le n \le 10 \\ 26n, & 10 < n \le 20 \\ 25n, & 20 < n \le 30 \\ 24n, & n > 30 \end{cases}$$

C) $$C = \begin{cases} 15+12n, & 0 \le n \le 10 \\ -95+23n, & 10 < n \le 20 \\ -295+33n, & 20 < n \le 30 \\ -565+42n, & n > 30 \end{cases}$$

D) $$C = \begin{cases} 15+12n, & 0 \le n \le 10 \\ 15+23n, & 10 < n \le 20 \\ 15+33n, & 20 < n \le 30 \\ 15+42n, & n > 30 \end{cases}$$

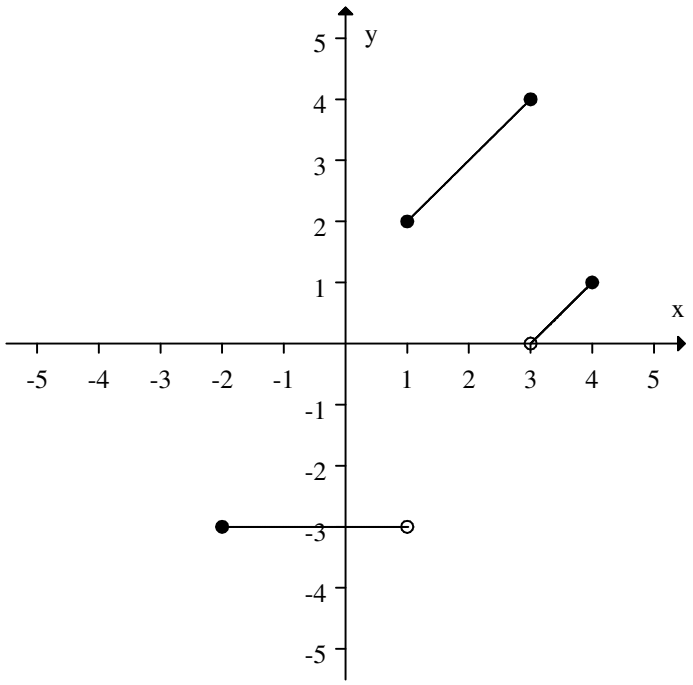
Ans: A Learning Objective: Write a formula for a piecewise-defined function. difficulty: medium

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6. Graph the function:

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

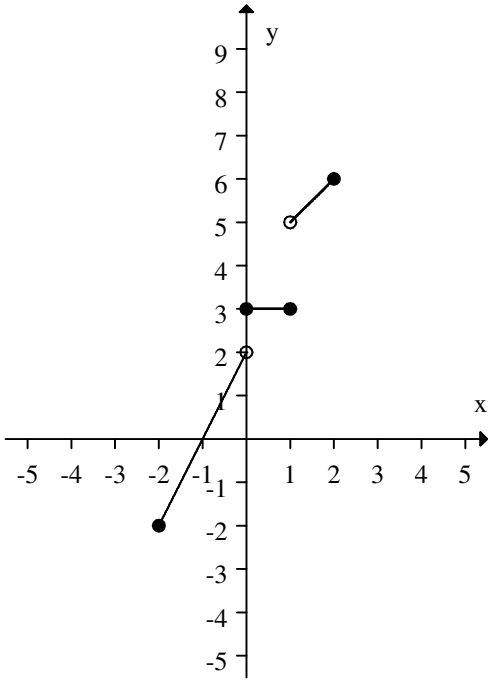
Ans:



Learning Objective: Compute values and sketch the graph of a piecewise-defined function. difficulty: medium

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7. Write a formula for the following function:



Ans:
$$f(x)=\begin{cases}2x+2, & -2\le x<0\\ 3, & 0\le x\le 1\\ x+4, & 1<x\le 2\end{cases}$$

Learning Objective: Write a formula for a piecewise-defined function.
difficulty: hard

8. Use the definition of absolute value to write a piecewise formula for $f(x)=\left|3x^2-27\right|$.

Ans:
$$f(x)=\begin{cases}3x^2-27, & x\le -3\\ -3x^2+27, & -3<x<3\\ 3x^2-27, & x\ge 3\end{cases}$$

Learning Objective: Understand and use the distance interpretation of absolute value.
difficulty: hard

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9. Let $f(x)=\begin{cases}4-2x, & -3\le x\le -1\\ x+4, & -1< x\le 3\\ 11, & 3< x\le 5\end{cases}$. Evaluate:

a) $f(-1)$

b) $f(2)$

c) $f(5)$

Ans: a) $f(-1)=6$

b) $f(2)=6$

c) $f(5)=11$

Learning Objective: Compute values and sketch the graph of a piecewise-defined function. difficulty: easy

10. Fred's cell phone company charges \$60 per month and \$0.35 for each minute (or part of a minute) over 100 minutes.

a) Write a formula for the company's policy.

b) How much is Fred's cell phone bill for the month if he talks for 138 minutes.

Ans: a) $f(m)=\begin{cases}60, & 0\le m\le 100\\ 60+0.35(x-100), & 100\le m\end{cases}$

b) \$73.30

Learning Objective: Write a formula for a piecewise-defined function.
difficulty: medium

11. Fred's cell phone company charges \$60 per month and \$0.45 for each minute (or part of a minute) over 105 minutes. Which of the following is the domain of the function?

A) $x\ge 0$

B) $x\ge 60$

C) $x\ge 105$

D) $0\le x\le 105$

Ans: A Learning Objective: Compute values and sketch the graph of a piecewise-defined function.; Write a formula for a piecewise-defined function.
difficulty: medium

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12. Which of the following is a piecewise formula for the function $f(x)=|3x-15|$

A) $f(x)=\begin{cases}15-3x, & x\le 5\\ 3x-15, & x>5\end{cases}$

B) $f(x)=\begin{cases}3x-15, & x\le 5\\ 15-3x, & x>5\end{cases}$

C) $f(x)=\begin{cases}15-3x, & x\le 15\\ 3x-15, & x>15\end{cases}$

D) $f(x)=\begin{cases}3x-15, & x\le 15\\ 15-3x, & x>15\end{cases}$

Ans: A Learning Objective: Understand and use the distance interpretation of absolute value. difficulty: medium

13. Let $f(x)=\begin{cases}-5, & -8\le x\le -1\\ x-4, & -1<x<3\\ 2x+2, & 3\le x\le 6\end{cases}$.

a) What is the domain of f ?

b) What is the range of f ?

Ans: a) Domain: $-8\le x\le 6$

b) Range: All real numbers y such that $-5\le y<-1$ or $8\le y\le 14$

Learning Objective: Compute values and sketch the graph of a piecewise-defined function. difficulty: medium

14. Let $f(x)=\begin{cases}-4, & -10\le x\le -1\\ x-3, & -1<x<3\\ 2x+1, & 3\le x\le 9\end{cases}$.

a) Evaluate $f(0)$.

b) Evaluate $f(-1)$.

c) Evaluate $f(3)$.

Ans: a) $f(0)=-3$

b) $f(-1)=-4$

c) $f(3)=7$

Learning Objective: Compute values and sketch the graph of a piecewise-defined function. difficulty: easy

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15. Which of the following is a piecewise defined function for $f(x)=\dfrac{|2x|}{x}$?

A) $f(x)=\begin{cases}-2, & x<0\\ 2, & x>0\end{cases}$

B) $f(x)=\begin{cases}-2, & x\le 0\\ 2, & x>0\end{cases}$

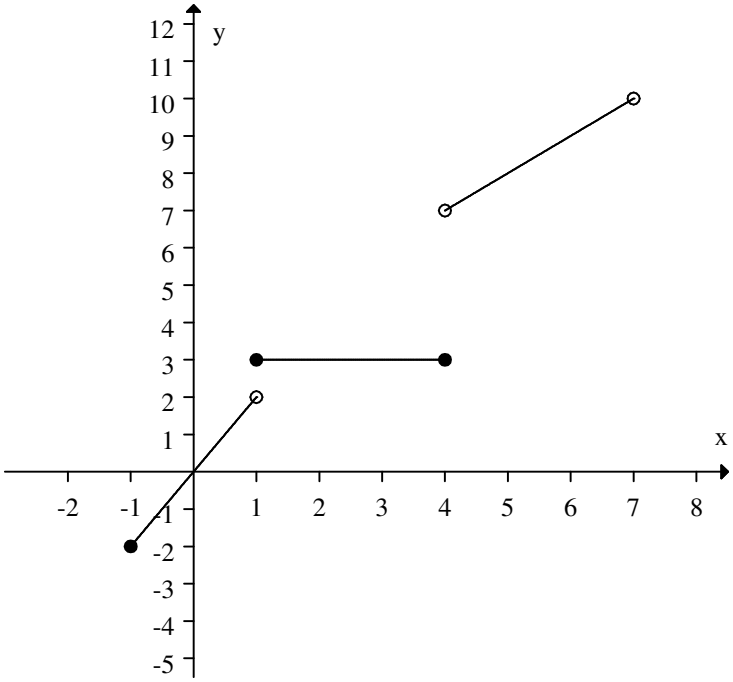
C) $f(x)=\begin{cases}-2, & x<0\\ 0, & x=0\\ 2, & x>0\end{cases}$

D) $f(x)=\begin{cases}-\dfrac{2}{x}, & x<0\\ \dfrac{2}{x}, & x>0\end{cases}$

Ans: A Learning Objective: Understand and use the distance interpretation of absolute value. difficulty: medium

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16. Find a formula for the following graph:



Ans: $f(x)=\begin{cases}2x, & -1\le x<1\\ 3, & 1\le x\le 4\\ x+3, & 4<x<7\end{cases}$

Learning Objective: Write a formula for a piecewise-defined function.
difficulty: hard

17. Let $f(x)=\begin{cases}2x-5, & x\le 0\\ 3x+8, & x>0\end{cases}$

a) Find the domain of f

b) Find the range of f

Ans: a) domain: all real numbers

b) range: all real numbers x such that $x\le -5$ or $x>8$

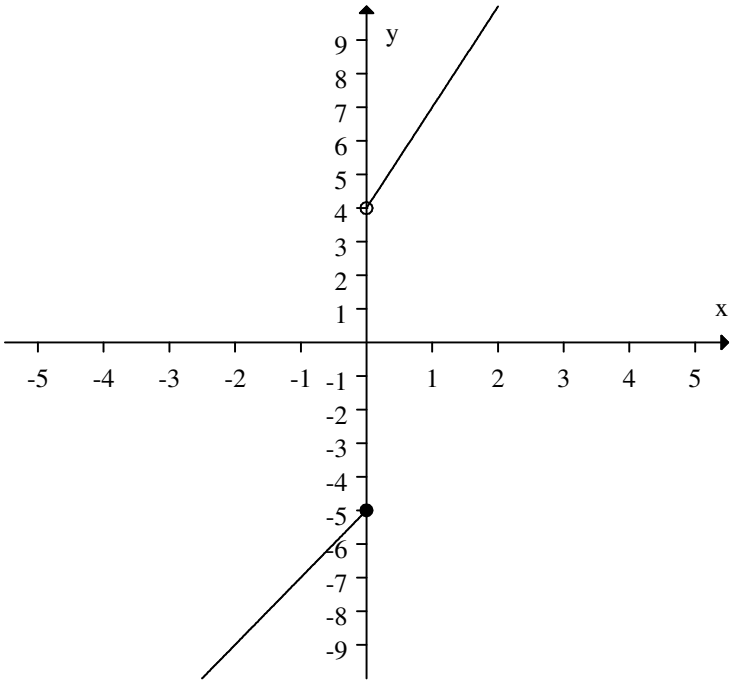
Learning Objective: Compute values and sketch the graph of a piecewise-defined function. difficulty: medium

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18. Let $f(x)=\begin{cases}2x-5, & x\le 0\\ 3x+4, & x>0\end{cases}$

Graph the function.

Ans:



Learning Objective: Compute values and sketch the graph of a piecewise-defined function. difficulty: medium

19. Let $f(x)=\begin{cases}25-x, & -5<x\le 1\\ x, & x>1\end{cases}$

a) Find the domain of f

b) Find the range of f

Ans: a) domain: $x>-5$

b) range: $x>1$

Learning Objective: Compute values and sketch the graph of a piecewise-defined function. difficulty: medium

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20. Let $f(x)=\begin{cases}21-x, & -5<x\le 2\\ x, & x>2\end{cases}$

a) Evaluate $f(-5)$

b) Evaluate $f(-3)$

c) Evaluate $f(2)$

d) Evaluate $f(10)$

Ans: a) $f(-5)$ is not defined since -5 is not in the domain of f

b) $f(-3)=24$

c) $f(2)=19$

d) $f(10)=10$

Learning Objective: Compute values and sketch the graph of a piecewise-defined function. difficulty: easy

Functions Modeling Change A Preparation for Calculus 6th edition Connally Test Bank

1. Let $g(x)=\sqrt{16-x^2}$. Which of the following functions will translate the graph of g 3 units to the left and 6 units down?

A) $h(x)=\sqrt{16-(x-3)^2}-6$

B) $h(x)=\sqrt{16-(x-3)^2}+6$

C) $h(x)=\sqrt{16-(x+3)^2}-6$

D) $h(x)=\sqrt{16-(x+3)^2}+6$

Ans: C Learning Objective: Understand the relationship between the graphs of the equations y = f(x) and y = f(x) + k, where k is a constant. difficulty: medium

2. Let $g(x)=\sqrt{25-x^2}$. The range of a function that will translate the graph of g 6 units to the right and 2 units up is _____ $\le y \le$_____

Part A: 2

Part B: 7

Learning Objective: Interpret a formula for a function whose graph is shifted vertically and horizontally from the graph of an original function. difficulty: medium

3. The graph of $f(x)$ contains the point (3, 1). What is the corresponding point on the graph of $f(x+5)$?

Ans: (–2, 1)

Learning Objective: Understand the relationship between the graphs of the equations y = f(x) and y = f(x + h), where h is a constant. difficulty: medium

4. If $r(t)=e^t$ for $t>0$, what is the formula for $s(t)=r(t-4)$?

A) $s(t)=e^{t-4}$

B) $s(t)=e^t-4$

C) $s(t)=e^{t+4}$

D) $s(t)=e^t+4$

Ans: A Learning Objective: Understand the relationship between the graphs of the equations y = f(x) and y = f(x + h), where h is a constant. difficulty: easy

Functions Modeling Change A Preparation for Calculus 6th edition Connally Test Bank

5. If $r(t) = e^t$ for $t > 0$, what is the formula for $s(t) = r(t) - 3$?

   A) $s(t) = e^{t-3}$

   B) $s(t) = e^t - 3$

   C) $s(t) = e^{t+3}$

   D) $s(t) = e^t + 3$

   Ans: B Learning Objective: Understand the relationship between the graphs of the equations y = f(x) and y = f(x) + k, where k is a constant. difficulty: easy

6. If $f(x) = 4x^2 + 5x$ and $g(x) = f(x-3)$, what is $g(3)$?

   Ans: 0

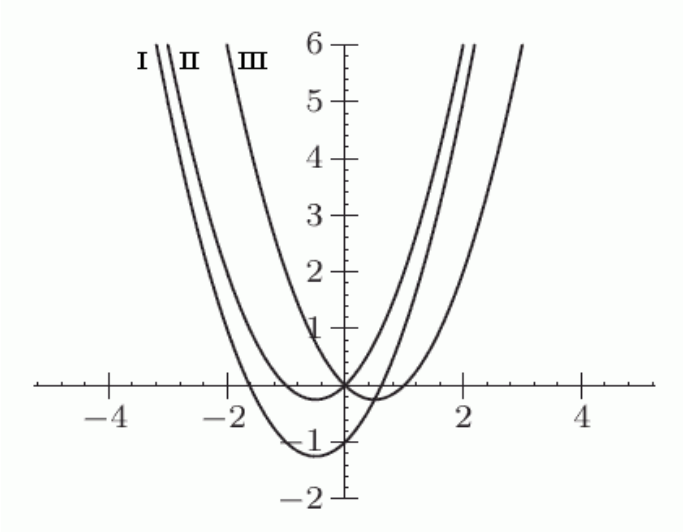
   Learning Objective: Understand the relationship between the graphs of the equations y = f(x) and y = f(x + h), where h is a constant. difficulty: easy

7. If $f(x) = 2x^2 + 4x$ and $h(x) = f(x) - 3$, what is $h(-1)$?

   Ans: –5

   Learning Objective: Understand the relationship between the graphs of the equations y = f(x) and y = f(x) + k, where k is a constant. difficulty: easy

8. For a given function $f(x)$, suppose $g(x) = f(x-1)$ and $h(x) = f(x) - 1$. All three functions are graphed below. Which curve shows the graph of h?



   Ans: I

   Learning Objective: Interpret a formula for a function whose graph is shifted vertically and horizontally from the graph of an original function. difficulty: medium

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9. Let $f(x) = \ln x$ and $g(x) = \ln(x+5)$ for $x > 0$. How does the graph of $g(x)$ compare to the graph of $f(x)$?

   A) The graph of $g(x)$ is 5 units up.

   B) The graph of $g(x)$ is 5 units down.

   C) The graph of $g(x)$ is 5 units to the right.

   D) The graph of $g(x)$ is 5 units to the left.

   Ans: D Learning Objective: Understand the relationship between the graphs of the equations y = f(x) and y = f(x + h), where h is a constant. difficulty: medium

10. Let $f(x) = \ln x$ and $g(x) = \ln(x) + 5$ for $x > 0$. How does the graph of $g(x)$ compare to the graph of $f(x)$?

    A) The graph of $g(x)$ is 5 units up.

    B) The graph of $g(x)$ is 5 units down.

    C) The graph of $g(x)$ is 5 units to the right.

    D) The graph of $g(x)$ is 5 units to the left.

    Ans: A Learning Objective: Understand the relationship between the graphs of the equations y = f(x) and y = f(x) + k, where k is a constant. difficulty: medium

11. What is the effect of the translation $f(x-3a)+b$ on the graph of the function $f(x)$? Assume a and b are positive constants.

    A) Shift right 3a, then up b.

    B) Shift right 3a, then down b.

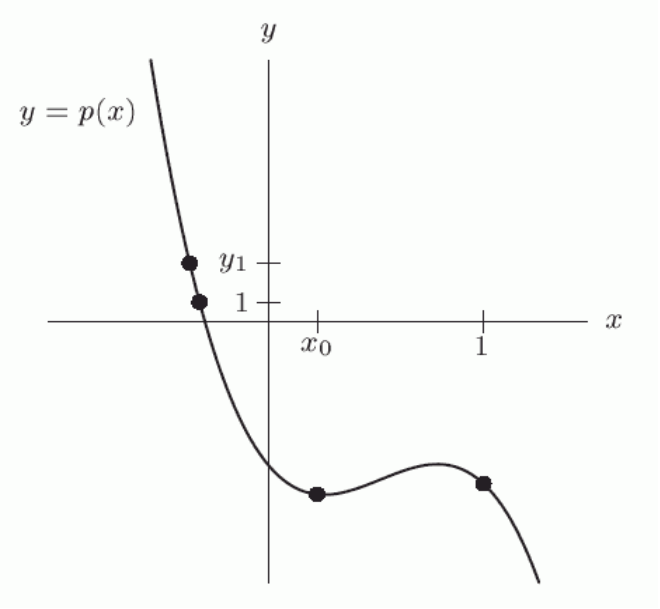
    C) Shift left 3a, then up b.

    D) Shift left 3a, then down b.

    Ans: A Learning Objective: Interpret a formula for a function whose graph is shifted vertically and horizontally from the graph of an original function. difficulty: medium

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12. Let $y = p(x)$ be defined by the following graph, and let $y_0 = p(x_0)$ and $y_1 = p(x_1)$.



Arrange the following values in order from least to greatest by placing a "1" next to the least, a "2" next to the next least, etc.

A. 0

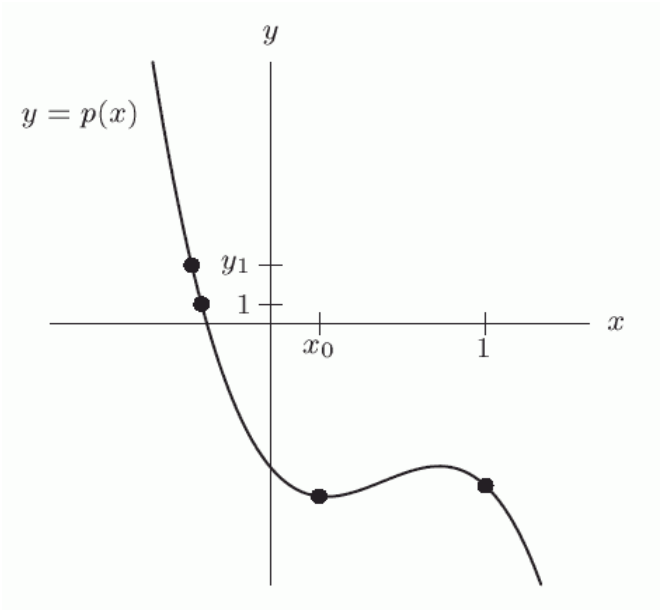
B. y_0

C. x_0

Part A: 2
Part B: 1
Part C: 3
Learning Objective: Interpret a formula for a function whose graph is shifted vertically and horizontally from the graph of an original function. difficulty: medium

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13. Let $y = p(x)$ be defined by the following graph, and let $y_0 = p(x_0)$ and $y_1 = p(x_1)$.



Which of the following two values is greater?

A) $p(x_0 - 1)$

B) $p(x_0)$

Ans: A Learning Objective: Understand the relationship between the graphs of the equations y = f(x) and y = f(x) + k, where k is a constant. difficulty: medium

14. Find the domain and range of $h(x) = x^2 + 7$.

A) Domain: $0 \le x < \infty$, Range: $7 \le h(x) < \infty$

B) Domain: $-\infty < x < \infty$, Range: $7 \le h(x) < \infty$

C) Domain: $-\infty < x < \infty$, Range: $0 \le h(x) \le 7$

D) Domain: $0 \le x < \infty$, Range: $0 \le h(x) \le 7$

E) Domain: $0 \le x < 7$, Range: $-\infty \le h(x) < \infty$

Ans: B Learning Objective: Understand the relationship between the graphs of the equations y = f(x) and y = f(x) + k, where k is a constant. difficulty: easy

15. Find the domain and range of $h(x) = x^2 + 5$ if $h(x)$ represents the number of hours it takes a farmer to fertilize a square field with side length x (in thousands of feet).

A) Domain: $0 \le x < \infty$, Range: $5 \le h(x) < \infty$

B) Domain: $-\infty < x < \infty$, Range: $5 \le h(x) < \infty$

C) Domain: $-\infty < x < \infty$, Range: $0 \le h(x) \le 5$

D) Domain: $0 \le x < \infty$, Range: $0 \le h(x) \le 5$

E) Domain: $0 \le x < 5$, Range: $0 \le h(x) < \infty$

Ans: A Learning Objective: Understand the relationship between the graphs of the equations y = f(x) and y = f(x) + k, where k is a constant. difficulty: easy

Functions Modeling Change A Preparation for Calculus 6th edition Connally Test Bank

16. The graph of $g(x)$ contains the point (3, 5). Which formula for a translation of g has a graph containing the point (8, 8)?

A) $g(x-5)+3$

B) $g(x+5)-3$

C) $g(x-8)+8$

D) $g(x+8)-8$

Ans: A Learning Objective: Interpret a formula for a function whose graph is shifted vertically and horizontally from the graph of an original function.
difficulty: medium

17. A bowling alley charges \$2.60 for shoes plus \$2.75 per game bowled. Let $C(g)$ be the total cost for bowling g games (including shoe rental). Now suppose the bowling alley decides to increase the cost for shoes by \$2.00 and include the first game for free. What is the formula for the new total cost, $N(g)$, of bowling g games as a transformation of $C(g)$?

A) $N(g)=C(g-2.75)+4.60$

B) $N(g)=C(g-1)+2.00$

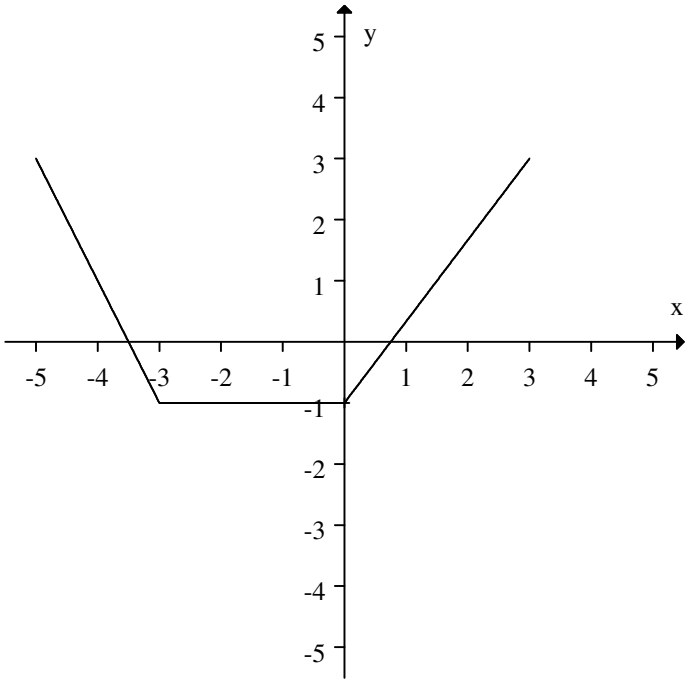
C) $N(g)=C(g-1)+4.60$

D) $N(g)=C(g+1.75)+2.00$

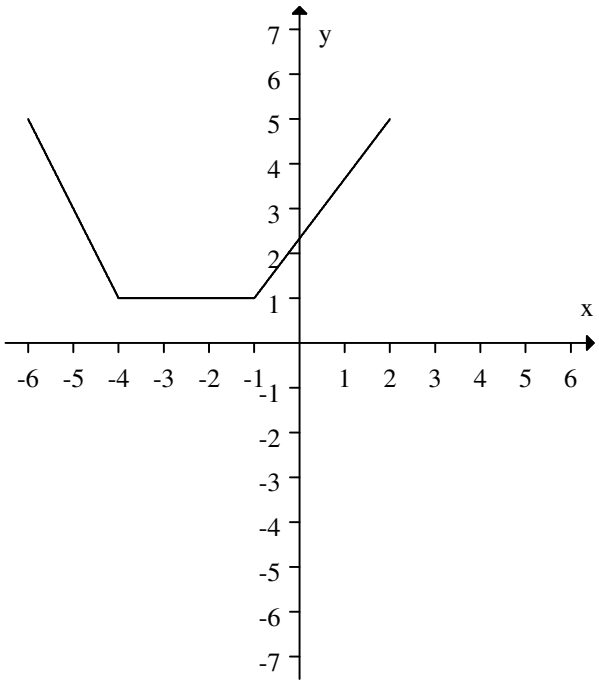
Ans: B Learning Objective: Interpret a formula for a function whose graph is shifted vertically and horizontally from the graph of an original function.
difficulty: medium

Functions Modeling Change A Preparation for Calculus 6th edition Connally Test Bank

18. The graph of $f(x)$ is given below. Sketch a graph of $f(x+1)+2$



Ans:

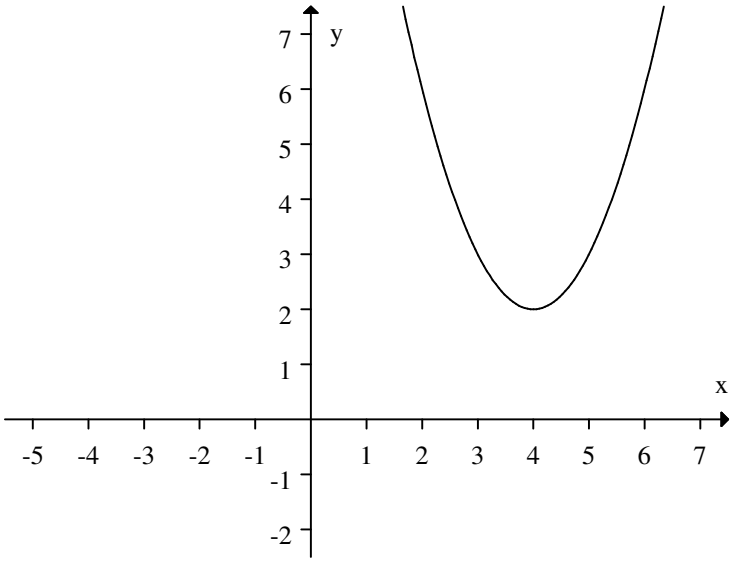


Learning Objective: Interpret a formula for a function whose graph is shifted vertically and horizontally from the graph of an original function. difficulty: medium

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19. Sketch the graph of $f(x)=(x-4)^2+2$

Ans:



Learning Objective: Interpret a formula for a function whose graph is shifted vertically and horizontally from the graph of an original function. difficulty: hard

20. Use the table below to answer the following questions.

x	-2	-1	0	1	2
$f(x)$	-3	4	-1	2	3

If $g(x)=f(x-1)-8$, compute

A) $g(-1)$

B) $g(0)$

C) $g(1)$

Part A: $g(-1)=-11$

Part B: $g(0)=-4$

Part C: $g(1)=-9$

Learning Objective: Interpret a formula for a function whose graph is shifted vertically and horizontally from the graph of an original function. difficulty: medium

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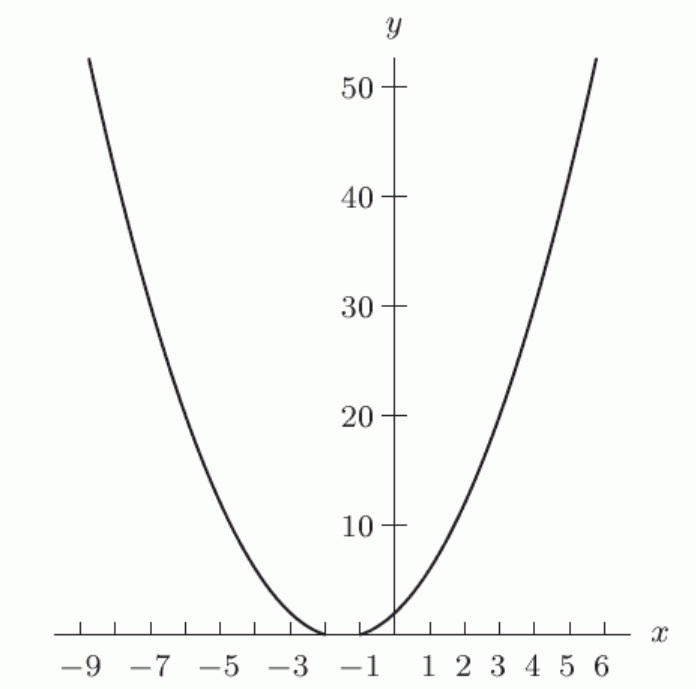
1. The probability of being in an accident increases as a driver's blood-alcohol content (BAC) rises. It has been observed that the probability rises faster and faster as the BAC increases. Let $P(x)$ be the probability that a driver will be involved in an accident as a function of x, the driver's BAC. Let L be the BAC at or above which it is illegal to drive. Let $b = P(0)$. What is the meaning of $P^{-1}(5b)$?
   A) The probability of an accident for someone who has had 5 drinks.
   B) 5 times the probability of an accident for someone who hasn't been drinking.
   C) The BAC at which the probability of an accident is 5 times that of a person who hasn't been drinking.
   D) The BAC at which the probability of an accident is 5 times that of a person whose BAC is at the legal level.
   Ans: C Learning Objective: Interpret the inverse function of f as a function that accepts an output of f and returns the corresponding input. difficulty: medium

2. The function $D(p) = 1200 - 200p$ gives the weekly demand for DVD rentals at Joe's Videolog when Joe charges $\$p$ to rent a DVD. What does $D^{-1}(60)$ mean in practical terms?
   A) The number of rentals demanded if Joe charges \$60 per rental.
   B) The rental fee Joe must charge to get a weekly demand of 60 rentals.
   C) The profit Joe makes if he charges \$60 per rental.
   D) The rental fee Joe must charge to get a profit of \$60.
   Ans: B Learning Objective: Interpret the inverse function of f as a function that accepts an output of f and returns the corresponding input. difficulty: medium

3. What are the units of $f^{-1}(H)$ if $H = f(t)$ is the average height, in inches, of a plant t weeks old?
   Ans: weeks
   Learning Objective: Interpret the inverse function of f as a function that accepts an output of f and returns the corresponding input. difficulty: medium

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4. Use the graph of $f(x) = x^2 + 3x + 2$ given below to estimate $f^{-1}(25)$. (Mark all correct answers)

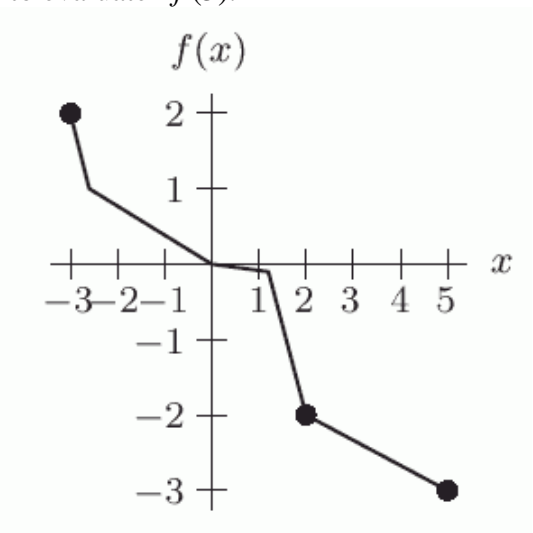


A) 3.5
B) –3.5
C) 6.5
D) –6.5
E) –1.5
F) 1.5

Ans: A, D Learning Objective: Interpret the inverse function of f as a function that accepts an output of f and returns the corresponding input. difficulty: medium

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5. Use the following figure to evaluate $f(5)$.



Ans: –3
Learning Objective: Interpret the inverse function of f as a function that accepts an output of f and returns the corresponding input. difficulty: medium

6. Use the following table to evaluate $f(2)$.

x	0	1	2	3	4
$f(x)$	–1	0	1	2	3

Ans: 1
Learning Objective: Interpret the inverse function of f as a function that accepts an output of f and returns the corresponding input. difficulty: medium

7. Let $C(f(t))$ be a composite function, where $V = f(t)$ is the volume of water, in cubic feet, emitted by a sprinkler system after t minutes, and $C(V)$ is the cost, in dollars, of V cubic feet of water. What are the units of $C(f(t))$?
   A) cubic feet
   B) minutes
   C) dollars
   Ans: C Learning Objective: Compute and interpret the composition of two functions. difficulty: easy

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8. If $y = f(x) = x^7 + 6$, what is the inverse function $f^{-1}(y)$?

A) $\sqrt[7]{y-6}$

B) $\sqrt[7]{y+6}$

C) $\sqrt[7]{y}-6$

D) $\sqrt[7]{y}+6$

Ans: A Learning Objective: Find a formula for the inverse function of a given function. difficulty: medium

9. The circumference, in cm, of a circle whose radius is r cm is given by $C = 2\pi r$. If $C = f(r)$, evaluate and interpret $f^{-1}(14\pi)$.

A) $28\pi^2$, the circumference of a circle with radius 14π.

B) $28\pi^2$, the radius of a circle with circumference 14π.

C) 7, the circumference of a circle with radius 14π.

D) 7, the radius of a circle with circumference 14π.

Ans: D Learning Objective: Find a formula for the inverse function of a given function.; Interpret the inverse function of f as a function that accepts an output of f and returns the corresponding input. difficulty: medium

10. Given $f(x) = 4x^2 - 2$ and $g(x) = -3x + 1$, find $f\left(g(5)\right)$ and $g\left(f(5)\right)$.

Ans: $f\left(g(5)\right) = 782$

$g\left(f(5)\right) = -293$

Learning Objective: Compute and interpret the composition of two functions. difficulty: medium

11. Suppose f and g are invertible functions such that $f(-7) = -12$, $f(-8) = -14$, $f(-14) = -9$, $g(-11) = -6$, $g(-8) = -10$, and $g(-14) = -12$. Find $f^{-1}\left(g\left(f(-8)\right)\right)$.

Ans: -7

Learning Objective: Compute and interpret the composition of two functions.; Interpret the inverse function of f as a function that accepts an output of f and returns the corresponding input. difficulty: medium

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12. Suppose $f(x)=2(x-3)$ and suppose that g is an invertible function such that $g^{-1}(x)=\frac{1-9x}{2}$. Find $f(g(x))$ and write it in the form $ax+b$.
Ans: $\frac{-4}{9}x-\frac{52}{9}$
Learning Objective: Compute and interpret the composition of two functions.; Interpret the inverse function of f as a function that accepts an output of f and returns the corresponding input. difficulty: hard

13. Suppose $g(x)=\frac{1-11x}{3}$ and suppose that f is an invertible function such that $f^{-1}(x)=3(x-5)$. Find $f(g(x))$ and write it in the form $ax+b$.
Ans: $\frac{-11}{9}x+\frac{46}{9}$
Learning Objective: Compute and interpret the composition of two functions.; Find a formula for the inverse function of a given function. difficulty: hard

14. Let f and g be two invertible functions such that $f^{-1}(x)=(x-2)^3$ and $g(x)=2x+2$. Find $f(g^{-1}(4))$. Round your answer to two decimal places, if necessary.
Ans: 3.00
Learning Objective: Compute and interpret the composition of two functions.; Find a formula for the inverse function of a given function. difficulty: medium

15. Let f and g be two invertible functions such that $f^{-1}(x)=(x-5)^3$ and $g(x)=5x+2$. Find $f(g(4))$. Round your answer to two decimal places, if necessary.
Ans: 7.80
Learning Objective: Compute and interpret the composition of two functions.; Find a formula for the inverse function of a given function. difficulty: medium

16. Let f and g be two invertible functions such that $f^{-1}(x)=\frac{4}{x+4}$ and $g(x)=3(x-2)$. Find $f(g^{-1}(5))$. Round your answer to two decimal places, if necessary.
Ans: –2.91
Learning Objective: Compute and interpret the composition of two functions.; Find a formula for the inverse function of a given function. difficulty: hard

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17. Let f and g be two invertible functions such that $f^{-1}(x)=\dfrac{3}{x+3}$ and $g(x)=2(x-2)$. Find $f(g(5))$. Round your answer to two decimal places, if necessary.
Ans: –2.50
Learning Objective: Compute and interpret the composition of two functions.; Find a formula for the inverse function of a given function. difficulty: hard

18. Let $f(x)=\dfrac{4}{\sqrt{x+36}}$ and $g(x)=x^2-13x$. Find the domain of $f(g(x))$.
Ans: All real numbers x such that $x<4$ or $x>9$.
Learning Objective: Compute and interpret the composition of two functions.
difficulty: medium

19. Let $f(x)=\dfrac{6}{\sqrt{x+21}}$ and $g(x)=x^2-10x$. Is $x=6$ in the domain of $f(g(x))$?
Ans: No.
Learning Objective: Compute and interpret the composition of two functions.
difficulty: easy

20. Let $f(x)=\dfrac{1}{x+4}$ with the domain $[-2,3]$. Find the domain of f^{-1}.
Ans: All x such that $\dfrac{1}{7}\le x\le\dfrac{1}{2}$.
Learning Objective: Interpret the inverse function of f as a function that accepts an output of f and returns the corresponding input. difficulty: medium

21. Find the inverse for the function $y=f(x)=4x+3$.
A) $f^{-1}(x)=\dfrac{x}{4}-3$
B) $f^{-1}(x)=4x-3$
C) $f^{-1}(x)=\dfrac{x-3}{4}$
D) $f^{-1}(x)=\dfrac{x-4}{3}$
Ans: C Learning Objective: Find a formula for the inverse function of a given function. difficulty: easy

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22. Find the inverse for the function $y = f(x) = 3x + 6$.
Ans: $f^{-1}(x) = \dfrac{x-6}{3}$
Learning Objective: Find a formula for the inverse function of a given function.
difficulty: easy

23. Find the inverse for the function $y = f(x) = x^4 + 5$.
Ans: $f^{-1}(x) = \sqrt[4]{x-5}$
Learning Objective: Find a formula for the inverse function of a given function.
difficulty: easy

24. For the function $f(x) = \dfrac{x}{2} - 3$, evaluate $f^{-1}(3)$
Ans: 12
Learning Objective: Find a formula for the inverse function of a given function.
difficulty: easy

25. Given the function $f(x) = 2x^2 - 6$, find the domain of $f^{-1}(x)$.
Ans: domain = $(-6, \infty)$
Learning Objective: Interpret the inverse function of f as a function that accepts an output of f and returns the corresponding input. difficulty: medium

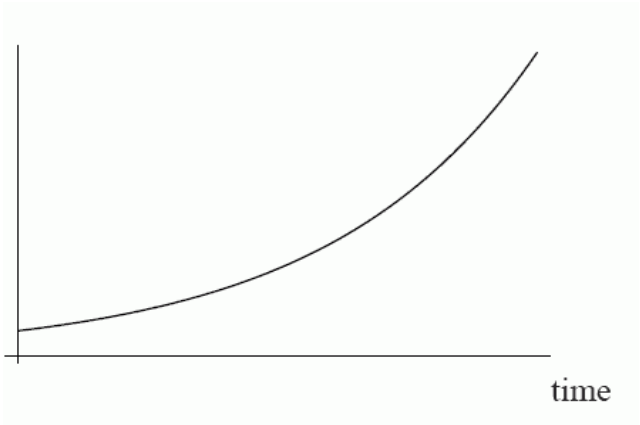
26. Given the function $f(x) = \sqrt{x-3}$, find the range of $f^{-1}(x)$.
Ans: range = $(3, \infty)$
Learning Objective: Interpret the inverse function of f as a function that accepts an output of f and returns the corresponding input. difficulty: medium

27. Given the function $f(x) = 5x - 2$, find the domain of $f^{-1}(x)$.
Ans: domain = $(-\infty, \infty)$
Learning Objective: Interpret the inverse function of f as a function that accepts an output of f and returns the corresponding input. difficulty: medium

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1. A model rocket is launched from the roof of a building. For height h, in meters, and time t, in seconds, after the rocket is launched, the height of the rocket above the ground is given by $h = f(t) = -4.9t^2 + 42t + 24$. Is the graph of $f(t)$ concave up or concave down?
   Ans: concave down
   Learning Objective: Identify the concavity of a graph of a function, either from the graph itself or from a verbal description or table of values of the function.
   difficulty: medium

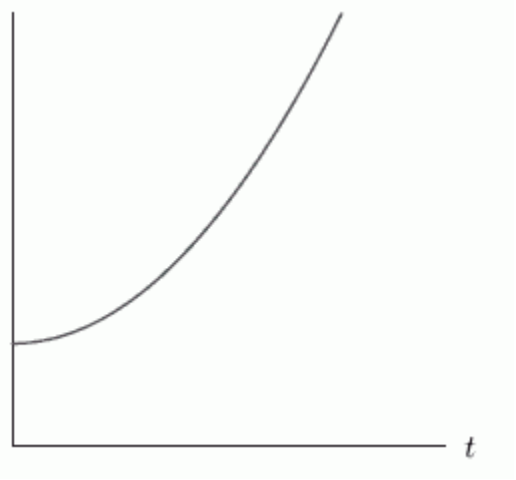
2. The number of bacteria in a sample grows slowly at first, but then grows with increasing rapidity. Does the following figure accurately represent the number of bacteria in a sample graphed against time?



   Ans: yes
   Learning Objective: Identify the concavity of a graph of a function, either from the graph itself or from a verbal description or table of values of the function.
   difficulty: medium

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3. Which scenario below best matches the following graph?



A) The cost of a new car is increasing at an ever increasing rate.
B) The annual profits made by Upper Midwest Industries are decreasing at a higher rate each year.
C) The medication is slowing the rise of a child's temperature.
D) The price of memory chips isn't decreasing as quickly as it used to be.

Ans: A Learning Objective: Identify the concavity of a graph of a function, either from the graph itself or from a verbal description or table of values of the function.
difficulty: medium

4. Calculate successive rates of change for the function $g(t)$ shown in the following table to determine if the graph is more likely concave up or concave down for $0 \le t \le 3$.

t	0	1	2	3
$g(t)$	1	8	14	19

A) concave down
B) concave up
C) neither

Ans: A Learning Objective: Identify the concavity of a graph of a function, either from the graph itself or from a verbal description or table of values of the function.
difficulty: medium

5. Calculate successive rates of change for the function $f(x)$ shown in the following table to determine if the graph is more likely concave up or concave down for $0.1 \le x \le 0.4$.

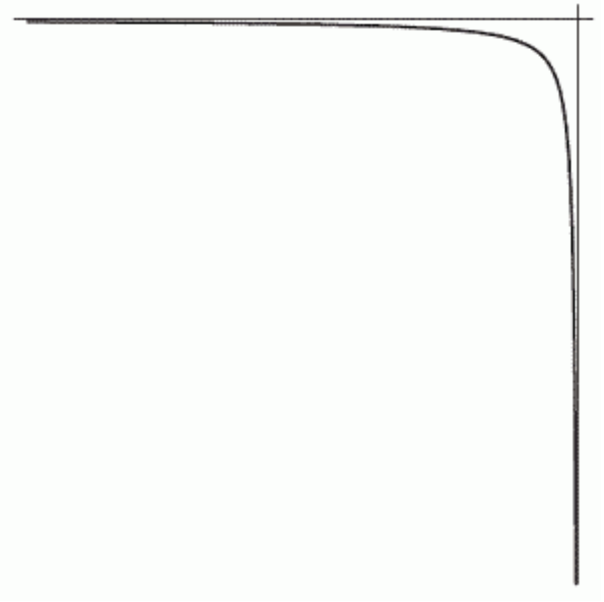
x	0.1	0.2	0.3	0.4
$f(x)$	–1.5	–2.2	–2.7	–3

A) concave down
B) concave up
C) neither

Ans: B Learning Objective: Identify the concavity of a graph of a function, either from the graph itself or from a verbal description or table of values of the function.
difficulty: medium

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6. Does the following figure appear to be concave up, concave down, or neither?

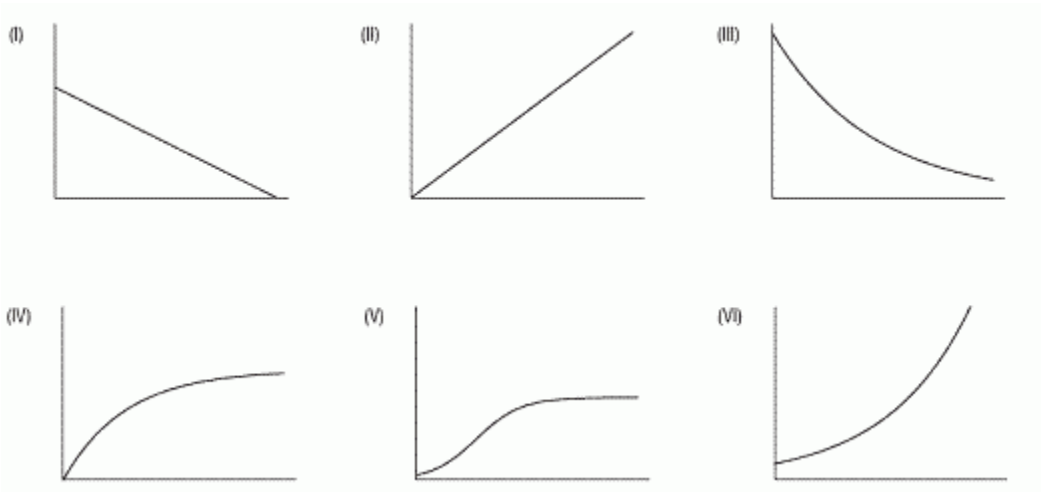


Ans: concave down
Learning Objective: Identify the concavity of a graph of a function, either from the graph itself or from a verbal description or table of values of the function.
difficulty: medium

7. Does the graph of $y = 3x^2 - 5x$ appear to be concave up, concave down, or neither?
Ans: concave up
Learning Objective: Identify the concavity of a graph of a function, either from the graph itself or from a verbal description or table of values of the function.
difficulty: medium

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8. The car slowed down steadily. Which of the following graphs shows the velocity graphed against time?



Ans: I
Learning Objective: Identify the concavity of a graph of a function, either from the graph itself or from a verbal description or table of values of the function.
difficulty: medium

9. The pollution decreased more slowly as time went on. Which of the following statements describes the graph of quantity of pollution against time?

(I) Increasing and concave up

(II) Decreasing and concave up

(III) Increasing and concave down

(IV) Decreasing and concave down

(V) None of the above
Ans: II
Learning Objective: Identify the concavity of a graph of a function, either from the graph itself or from a verbal description or table of values of the function.
difficulty: medium

10. Determine the concavity of the graph of $f(x) = -x^2 - x - 8$ between $x = -1$ and $x = 2$ by calculating average rates of change over intervals of length 1. Is the graph concave up or concave down?
Ans: concave down
Learning Objective: Identify the concavity of a graph of a function, either from the graph itself or from a verbal description or table of values of the function.
difficulty: medium

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11. The car slowed down steadily. Which of the following tables of values could represent $f(t)$ = velocity at time t?

(I)

t	0	10	20	30	40
$f(t)$	65	75	90	110	135

(II)

t	0	10	20	30	40
$f(t)$	65	60	55	50	45

(III)

t	0	10	20	30	40
$f(t)$	20	25	35	45	50

(IV)

t	0	10	20	30	40
$f(t)$	65	55	50	47	45

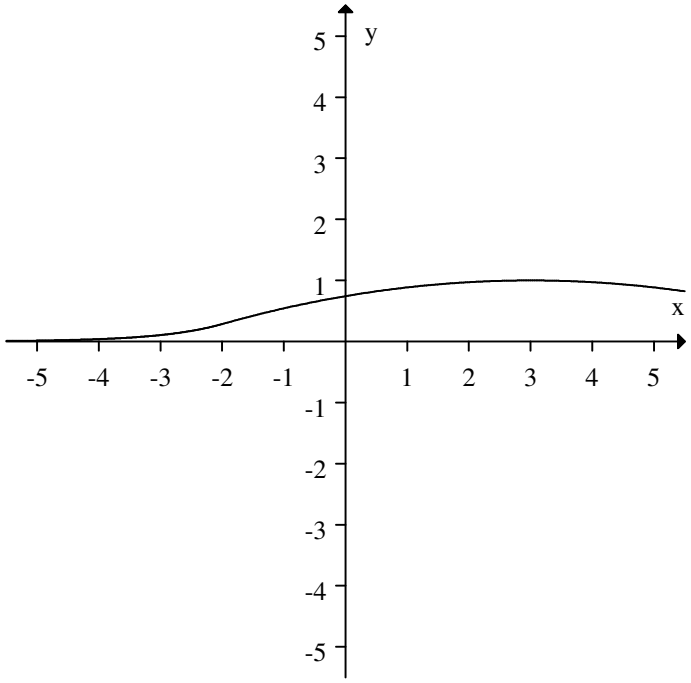
(V)

t	0	10	20	30	40
$f(t)$	20	30	36	38	38

Ans: II
Learning Objective: Identify the concavity of a graph of a function, either from the graph itself or from a verbal description or table of values of the functioIdentify the concavity of a graph of a function, either from the graph itself or from a verbal description or table of values of the function.n. difficulty: medium

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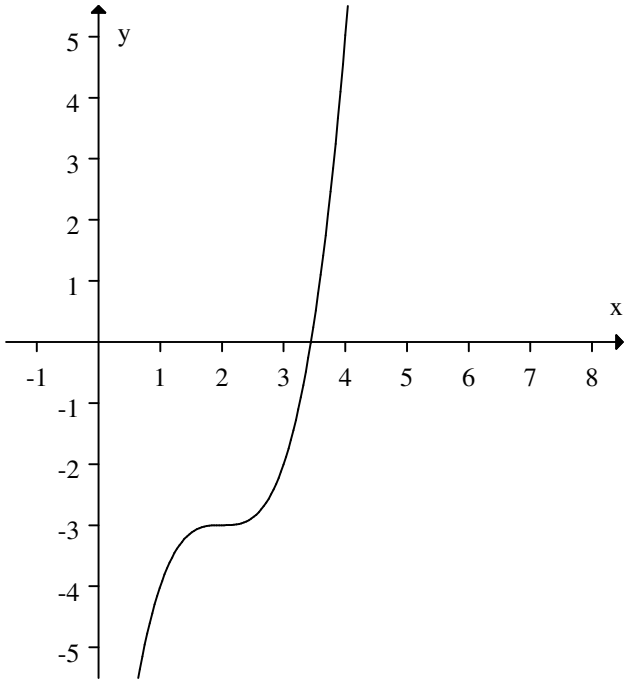
12. Sketch a graph of f so that f will have all of the following properties:
$f(3)=1$
f is increasing and concave up for $-\infty < x < -2$
f is increasing and concave down for $-2 < x < 3$
f is decreasing and concave down for $3 < x < \infty$
Ans: Sample answer:



Learning Objective: Identify the concavity of a graph of a function, either from the graph itself or from a verbal description or table of values of the function.
difficulty: hard

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13. Graph $f(x) = (x-2)^3 - 3$ and use the graph to give an estimate of the largest interval on which the function is concave up.
Ans:



The function is concave up for $2 < x < \infty$
Learning Objective: Identify the concavity of a graph of a function, either from the graph itself or from a verbal description or table of values of the function.
difficulty: easy

14. The graph of f is concave down for $-2 < x < 9$. Which of the following is the largest?
a) $\dfrac{f(5) - f(-1)}{5+1}$
b) $\dfrac{f(8) - f(6)}{8-6}$
Ans: a
Learning Objective: Identify the concavity of a graph of a function, either from the graph itself or from a verbal description or table of values of the function.
difficulty: hard

15. True or False: If f is increasing on $1 < x < 19$, then $f(3) > f(16)$
Ans: False Learning Objective: Identify the concavity of a graph of a function, either from the graph itself or from a verbal description or table of values of the function. difficulty: medium

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16. True or False: If f is decreasing and concave up on $-7 < x < 4$, then $\frac{f(3)-f(-2)}{3+2} > \frac{f(-1)-f(-6)}{-1+6}$.
Ans: True Learning Objective: Identify the concavity of a graph of a function, either from the graph itself or from a verbal description or table of values of the function. difficulty: hard

17. If $f(x)$ is decreasing and concave down on $-10 < x < 10$, which of the following must be true.
A) $\frac{f(7)-f(-4)}{7+4} > \frac{f(10)-f(7)}{10+7}$
B) $f(15)-f(-8) > 15+8$
C) $f(-4)-f(2) > 0$
D) $f(8) > f(-5)+\frac{8+5}{10-8}\left(f(10)-f(8)\right)$
Ans: A, C, D Learning Objective: Identify the concavity of a graph of a function, either from the graph itself or from a verbal description or table of values of the function. difficulty: hard

18. Use the following chart containing values of $f(x)$ to determine whether the function appears to be:
a) increasing or decreasing
b) concave up or concave down

x	1	2	3	4	5
$f(x)$	1.61	1.79	1.95	2.08	2.20

Ans: a) increasing
b) concave down
Learning Objective: Identify the concavity of a graph of a function, either from the graph itself or from a verbal description or table of values of the function.
difficulty: medium

19. Use the following chart containing values of $f(x)$ to determine whether the function appears to be:
a) increasing or decreasing
b) concave up or concave down

x	1	2	3	4	5
$f(x)$	2	0	–14	–52	–126

Ans: a) decreasing
b) concave down
Learning Objective: Identify the concavity of a graph of a function, either from the graph itself or from a verbal description or table of values of the function.
difficulty: medium

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20. True or False: It is possible for the graph of a function to be increasing and concave down on the interval $(-\infty, 2)$ and increasing and concave up on the interval $(2, \infty)$.

    Ans: True Learning Objective: Identify the concavity of a graph of a function, either from the graph itself or from a verbal description or table of values of the function. difficulty: medium

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