Calculus Concepts and Contexts 5th edition Stewart Test Bank

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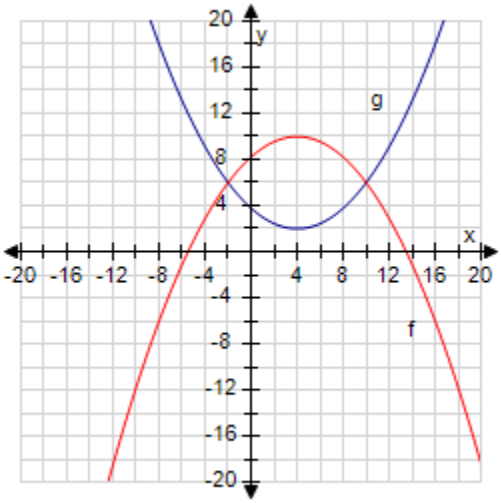
Calculus Concepts and Contexts 5th edition Stewart Test Bank

1.1 Four Ways to Represent a Function

1. The graphs of $f(x)$ and $g(x)$ are given. For what values of x is $f(x) = g(x)$?



a. 2, 3
b. 0
c. –1
d. –2, 5
e. –2, 10

ANSWER: e
POINTS: 1
DIFFICULTY: Medium
REFERENCES: SCalcET7 1.1.4b SCalc7e 1.1.4b
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
STUDENT ENTRY MODE: Basic
LEARNING OBJECTIVES: PCALC.COH.LO.01.01.12 - Express a function numerically, given its verbal, algebraic,or graphical representation.
OTHER: Bimodal
NOTES: SCalcET7 Section 1.1 SCalc7e Section 1.1
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2. Which of the following functions is neither even nor odd?

a. $f(x) = \dfrac{2x^2}{x^4+1}$

b. $f(x) = 8x^3 + 10x^2 + 7$

c. $f(x) = x^3 - 3x$

ANSWER: b

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1.1 Four Ways to Represent a Function

POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.78 SCalc7e 1.1.78
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.04.03 - Determine if a function is odd or even algebraically.
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
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DATE MODIFIED:	1/18/2021 10:52 AM

3. If the point $(9, 7)$ is on the graph of an even function, what other point must also be on the graph?

a. $(-9, -7)$
b. $(9, -7)$
c. (0, 0)
d. $(-9, 7)$
e. None of these

ANSWER:	d
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.71a SCalc7e 1.1.71a
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.04.05 - Describe the symmetry present in the graph of an even function.
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
DATE CREATED:	7/20/2015 1:44 PM
DATE MODIFIED:	1/29/2020 2:43 AM

4. If $f(x) = x^2 - x + 8$, evaluate the difference quotient $\dfrac{f(a+h) - f(a)}{h}$.

a. $2a + h - 8$
b. $2a - 8$
c. $2a - h - 8$
d. h
e. none of these

ANSWER:	e
POINTS:	1

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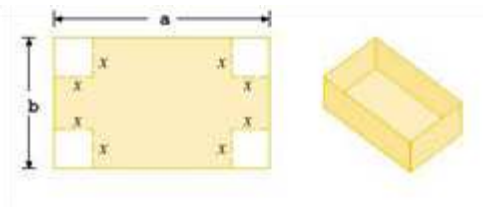
1.1 Four Ways to Represent a Function

DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.28 SCalc7e 1.1.28
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.01.08 - Evaluate functions for given values of the independent variable.
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
DATE CREATED:	7/20/2015 1:44 PM
DATE MODIFIED:	1/29/2020 2:48 AM

5. A box with an open top is to be constructed from a rectangular piece of card board with dimensions $b = 6$ in. by $a = 25$ in. by cutting out equal squares of side x at each corner and then folding up the sides as in the figure.

Express the volume V of the box as a function of x.



a. $V(x) = x^3 - 62x^2 + 150x$

b. $V(x) = 4x^3 + 31x^2 + 196x$

c. $V(x) = 4x^3 + 62x^2 + 150x$

d. $V(x) = x^3 - 31x^2 + 196x$

e. $V(x) = 4x^3 - 62x^2 + 150x$

ANSWER:	e
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.63 SCalc7e 1.1.63
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.01.11 - Express a function algebraically, given its verbal or numerical representation.
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
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6. Find an expression for the function $y = f(x)$ whose graph is the bottom half of the parabola

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1.1 Four Ways to Represent a Function

$x+(10-y)^2=0$.

a. $y=10-\sqrt{-x}$

b. $y=100-\sqrt{-x}$

c. $y=10+\sqrt{x}$

d. $y=100-x^2$

e. $y=10-x^2$

ANSWER:	a
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.53 SCalc7e 1.1.53
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.01.11 - Express a function algebraically, given its verbal or numerical representation.
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
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DATE MODIFIED:	1/29/2020 3:39 AM

7. A rectangle has perimeter 14 m. Express the area of the rectangle as a function $A(l)$ of the length l of one of its sides.

a. $A(l)=7l-l^2$

b. $A(l)=l-7l^2$

c. $A(l)=14l-l^2$

d. $A(l)=14l+l^2$

e. $A(l)=7l+l^2$

ANSWER:	a
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.57 SCalc7e 1.1.57
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.01.11 - Express a function algebraically, given its verbal or numerical representation.
OTHER:	Bimodal

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1.1 Four Ways to Represent a Function

NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
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8. If $f(x) = 5x^2 + 2$, find and simplify $\dfrac{f(1+h) - f(1)}{h}$, where $h \neq 0$.

a. $2 + 5h^2$

b. $5 + 10h$

c. $5h$

d. $10 + 5h$

ANSWER:	d
POINTS:	1
DIFFICULTY:	Easy
REFERENCES:	SCalcET7 1.1.27 SCalc7e 1.1.27
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.01.08 - Evaluate functions for given values of the independent variable.
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
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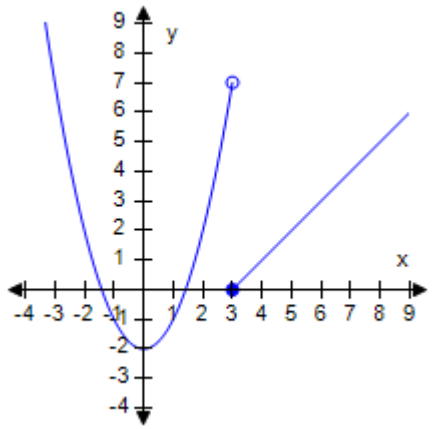
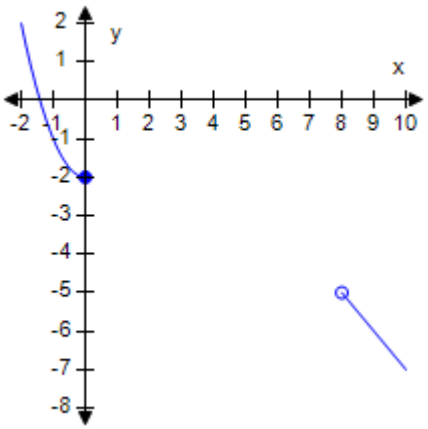
9. Find the domain and sketch the graph of the function. What is its range?

$$f(x) = \begin{cases} -x + 3 & \text{if } x \geq 3 \\ x^2 - 2 & \text{if } x < 3 \end{cases}$$

a. ***D***: $(-\infty, \infty)$; ***R***: $[-2, \infty)$



b. ***D***: $(-\infty, \infty)$; ***R***: $(-\infty, 0]$



c. ***D***: $(-\infty, \infty)$; ***R***: $[0, \infty)$

d. ***D***: $(-\infty, \infty)$; ***R***: $(-\infty, \infty)$

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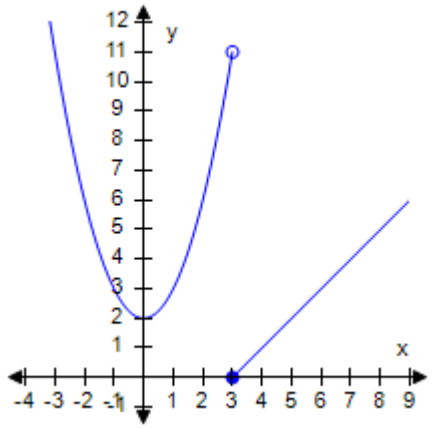

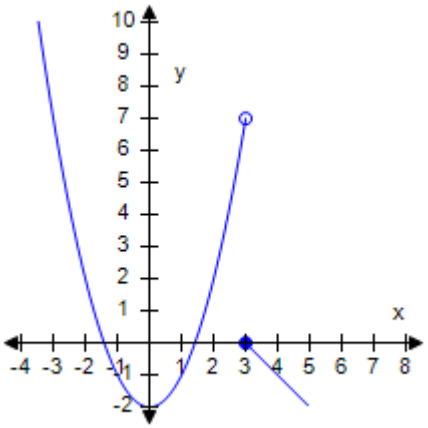

ANSWER:	d
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.49 SCalc7e 1.1.49
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.01.03 - Define range of a function.
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
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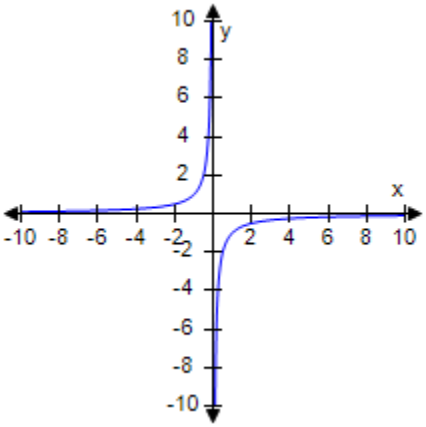
10. Determine whether the function whose graph is given is even, odd, or neither.



a. Even
b. Neither
c. Odd

ANSWER:	c
POINTS:	1

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1.1 Four Ways to Represent a Function

DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.69 SCalc7e 1.1.69
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.04.04 - Determine if a function is odd or even graphically.
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
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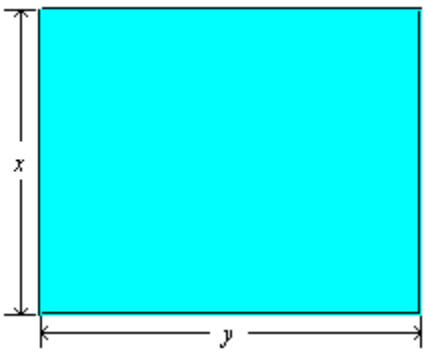
11. Sandy wishes to have a rectangular garden in her backyard. She has 50 ft of fencing with which to enclose her garden. Letting x denote the width of the garden, find a function f in the variable x that gives the area of the garden.



a. $f(x) = 50x - x^2,\ 0 < x < 25$

b. $f(x) = 25x - x^2,\ 0 < x < 25$

c. $f(x) = 50x - x^2,\ 0 < x < 50$

d. $f(x) = 25x - x^2,\ 0 < x < 50$

ANSWER:	b
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.62 SCalc7e 1.1.62
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.01.11 - Express a function algebraically, given its verbal or numerical representation.
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
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12. The graph of the function f is given. State the value of $f(2.7)$.

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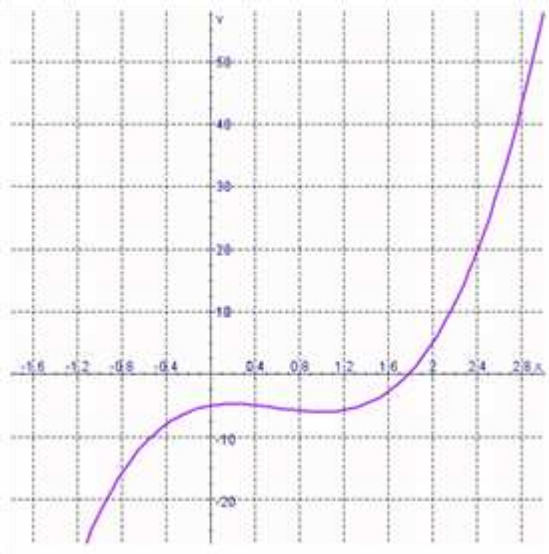
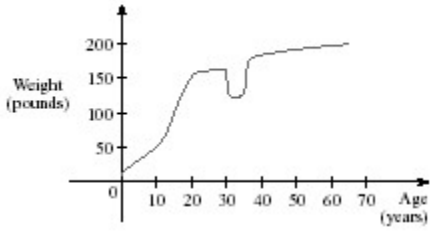


a. $f(2.7) = -40$
b. $f(2.7) = -10$
c. $f(2.7) = 40$
d. $f(2.7) = 0$
e. $f(2.7) = 10$

ANSWER:	c
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.3b SCalc7e 1.1.3b
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.02.03 - Identify the value of a function from its graph.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
DATE CREATED:	7/20/2015 1:44 PM
DATE MODIFIED:	2/25/2020 12:37 AM

13. The graph shown gives the weight of a certain person as a function of age. Find the age at which the person stopped an exercise program.



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a. 20
b. 54
c. 38
d. 35
e. 70

ANSWER:	d
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.11 SCalc7e 1.1.11
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.01.12 - Express a function numerically, given its verbal, algebraic,or graphical representation.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
DATE CREATED:	7/20/2015 1:44 PM
DATE MODIFIED:	2/25/2020 12:38 AM

14. In the function $f(x) = 8x + d$, what must be the value d, if $f(3) = 1$?

a. $d = 25$
b. $d = 23$
c. $d = -23$
d. $d = -1$
e. $d = -25$

ANSWER:	c
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.25 SCalc7e 1.1.25
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.01.08 - Evaluate functions for given values of the independent variable.
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
DATE CREATED:	7/20/2015 1:44 PM
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15. An open rectangular box with volume 4 m^3 has a square base. Express the surface area of the box as a function $S(x)$ of the length x of a side of the base.

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a. $S(x) = x^2 + \frac{16}{x^2}$

b. $S(x) = x^2 + \frac{16}{x}$

c. $S(x) = 2x^2 + \frac{6}{x^2}$

d. $S(x) = x^2 + \frac{6}{x^2}$

e. $S(x) = 2x + \frac{6}{x}$

ANSWER:	b
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.61 SCalc7e 1.1.61
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.01.11 - Express a function algebraically, given its verbal or numerical representation.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
DATE CREATED:	7/20/2015 1:44 PM
DATE MODIFIED:	1/29/2020 5:13 AM

16. Determine whether f is even, odd, or neither.

$$f(x) = \frac{8x^2}{x^4 + 5}$$

a. neither

b. odd

c. even

ANSWER:	c
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.74 SCalc7e 1.1.74
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.04.03 - Determine if a function is odd or even algebraically.
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1

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1.1 Four Ways to Represent a Function

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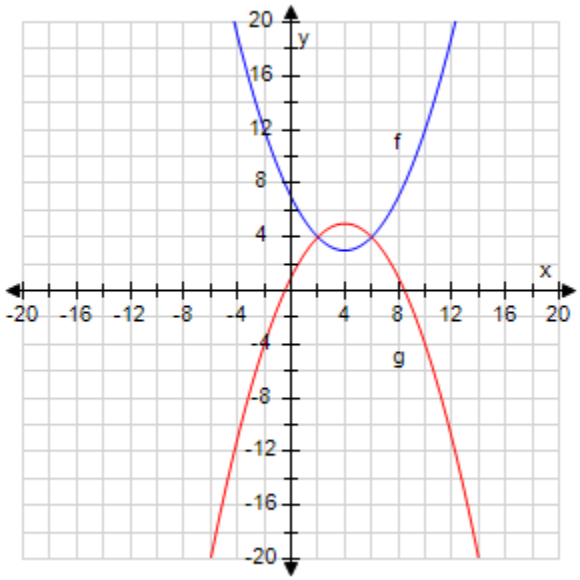
17. Determine whether f is even, odd, or neither.

$$f(x) = \frac{2x^2}{x^4+1}$$

ANSWER: even
POINTS: 1
DIFFICULTY: Medium
REFERENCES: SCalcET7 1.1.74 SCalc7e 1.1.74
QUESTION TYPE: Numeric Response
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.01.04.03 - Determine if a function is odd or even algebraically.
OTHER: Numerical Response
NOTES: SCalcET7 Section 1.1 SCalc7e Section 1.1
DATE CREATED: 7/20/2015 1:44 PM
DATE MODIFIED: 1/29/2020 5:42 AM

18. The graphs of $f(x)$ and $g(x)$ are given.
a) For what values of x is $f(x) = g(x)$?
b) Find the values of $f(-1)$ and $g(12)$.



ANSWER: a) 2, 6 b) $f(-1) = 12,\ g(12) = -10$

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POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.4ab SCalc7e 1.1.4ab
QUESTION TYPE:	Numeric Response
HAS VARIABLES:	True
LEARNING OBJECTIVES:	PCALC.COH.LO.01.02.03 - Identify the value of a function from its graph.
OTHER:	Numerical Response
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
DATE CREATED:	7/20/2015 1:44 PM
DATE MODIFIED:	2/25/2020 5:05 AM

19. A spherical balloon with radius r inches has volume $\frac{4}{3}\pi r^3$.

Find a function that represents the amount of air required to inflate the balloon from a radius of r inches to a radius of $r + 7$ inches.

ANSWER: $\frac{28}{3}\pi(3r^2+21r+49)$

POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.26 SCalc7e 1.1.26
QUESTION TYPE:	Numeric Response
HAS VARIABLES:	True
LEARNING OBJECTIVES:	PCALC.COH.LO.01.01.11 - Express a function algebraically, given its verbal or numerical representation.
OTHER:	Numerical Response
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
DATE CREATED:	7/20/2015 1:44 PM
DATE MODIFIED:	2/10/2020 6:12 AM

20. If $f(x)=\begin{cases} x^2+7 & \text{if } x \le 0 \\ \sqrt{x} & \text{if } x > 0 \end{cases}$

find $f(-3)$, $f(0)$, and $f(4)$.

ANSWER: $f(-3) = 16$, $f(0) = 7$, $f(4) = 2$.

POINTS: 1

DIFFICULTY: Easy

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1.1 Four Ways to Represent a Function

REFERENCES:	SCalcET7 1.1.25 SCalc7e 1.1.25
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.01.08 - Evaluate functions for given values of the independent variable.
OTHER:	Short Answer
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
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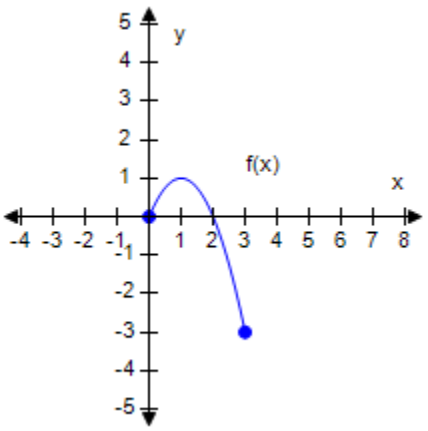
21. Refer to the graph of the function f in the following figure.



a. Find $f(0)$.
b. Find the value of x for which (i) $f(x) = 1$ and (ii) $f(x) = 0$.
c. Find the domain and range of f.

ANSWER:	**a.** 0 **b.** (**i**) 1 (**ii**) 0, 2 **c.** ***D***: [0, 3], ***R***: [–3, 1]
POINTS:	1
DIFFICULTY:	Easy
REFERENCES:	SCalcET7 1.1.3ace SCalc7e 1.1.3ace
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.01.03 - Define range of a function.
OTHER:	Short Answer
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
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DATE MODIFIED:	2/7/2020 4:51 AM

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22. Determine whether the function is even, odd, or neither.

$f(x) = 4x^2 + 8x + 1$

ANSWER:	Neither
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.77 SCalc7e 1.1.77
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.04.03 - Determine if a function is odd or even algebraically.
OTHER:	Short Answer
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
DATE CREATED:	7/20/2015 1:44 PM
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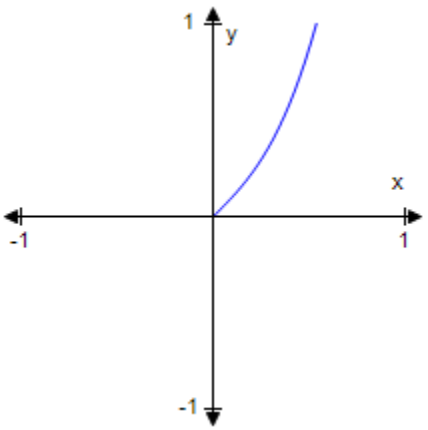
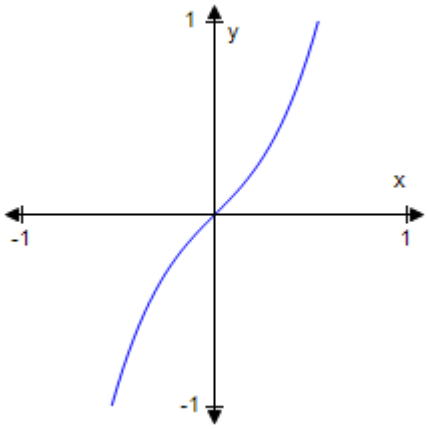
23. The following figure shows a portion of the graph of a function f defined on the interval [–1, 1]. Sketch the complete graph of f if it is known f is odd.



ANSWER:



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1.1 Four Ways to Represent a Function

POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.72b SCalc7e 1.1.72b
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.04.09 - Sketch graphs of functions that are symmetric with respect to the x-axis, y-axis, or the origin.
OTHER:	Short Answer
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
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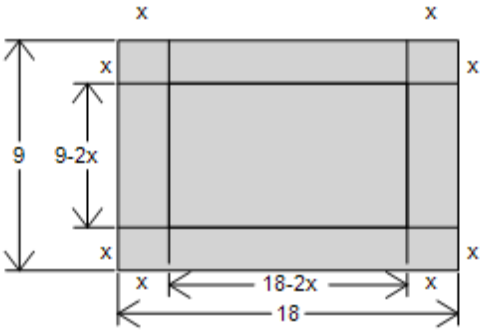
24. By cutting away identical squares from each corner of a rectangular piece of cardboard and folding up the resulting flaps, an open box can be made. If the cardboard is 18 in. long and 9 in. wide and the square cutaways have dimensions of x in. by x in., find a function that gives the volume of the resulting box.



ANSWER: $V = 4x^3 - 54x^2 + 162x$

POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.63 SCalc7e 1.1.63
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.01.11 - Express a function algebraically, given its verbal or numerical representation.
OTHER:	Short Answer
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
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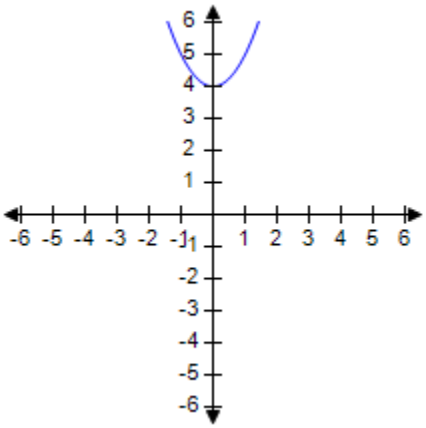
25. Use the vertical line test to determine whether the curve is the graph of a function of x.



ANSWER:	Yes
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.7 SCalc7e 1.1.7
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.01.06 - Given its graph, determine if a relation is a function using the vertical line test.
OTHER:	Short Answer
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
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26. Sketch the graph of the function.

$f(x) = |1 - 7x|$

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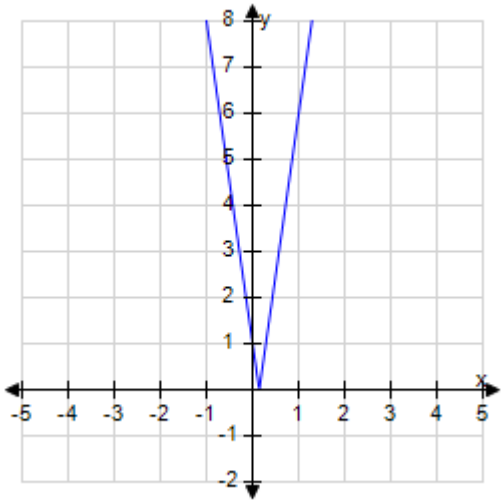
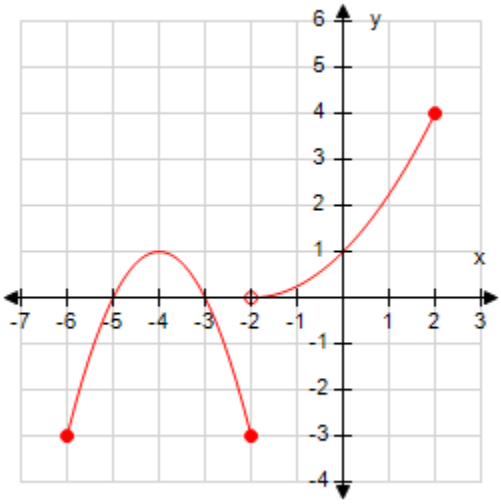
ANSWER:



POINTS:	1
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.01.13 - Express a function graphically, given its verbal or numerical representation.
DATE CREATED:	1/21/2021 7:28 AM
DATE MODIFIED:	2/5/2021 9:36 AM

27. The graph of a function g is given. On what interval(s) is g increasing?



ANSWER:	$[-6, -4] \cup (-2, 2]$
POINTS:	1
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	True

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1.1 Four Ways to Represent a Function

STUDENT ENTRY MODE: Basic
LEARNING OBJECTIVES: PCALC.COH.LO.01.02.07 - Find the intervals where a function is increasing and decreasing using its graph.
DATE CREATED: 1/21/2021 7:58 AM
DATE MODIFIED: 2/5/2021 9:36 AM

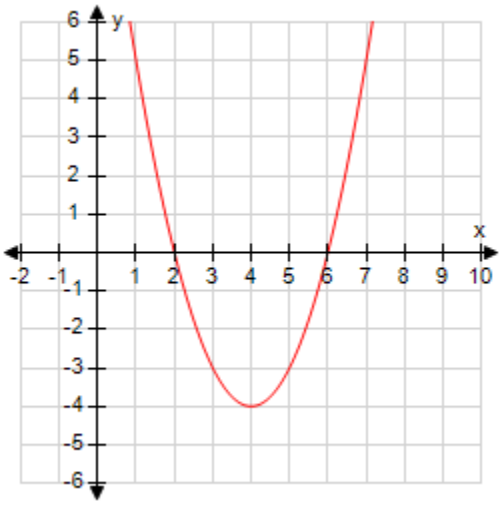
28. Determine whether the statement is true or false.

If $x_1 > x_2$ and f is a decreasing function, then $f(x_1) > f(x_2)$.

a. True
b. False

ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
LEARNING OBJECTIVES: PCALC.COH.UO.01.02.02 - Examine the characteristics of functions and their graphs.
DATE CREATED: 1/22/2021 2:50 AM
DATE MODIFIED: 2/5/2021 9:37 AM

29. Let f be the function whose graph is given. Find the interval where the function is decreasing.



a. $(-\infty, 4)$
b. $(4, \infty)$
c. $[2, 6]$
d. $(-4, \infty)$

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice

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1.1 Four Ways to Represent a Function

HAS VARIABLES:	True
LEARNING OBJECTIVES:	PCALC.COH.LO.01.02.07 - Find the intervals where a function is increasing and decreasing using its graph.
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1.2 Mathematical Models: A Catalog of Essential Functions

1. Many physical quantities are connected by *inverse square laws*, that is, by power functions of the form:

$$f(x) = kx^{-2}$$

In particular, the illumination of an object by a light source is inversely proportional to the square of the distance from the source. Suppose that after dark you are in a room with just one lamp and you are trying to read a book. The light is too dim and so you move $\frac{2}{3}$ ds the distance to the lamp. How much brighter is the light?

a. $\frac{3}{2}$ times

b. $\frac{9}{4}$ times

c. $\frac{9}{2}$ times

d. $\frac{4}{9}$ times

e. 3 times

ANSWER:	b
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.2.25 SCalc7e 1.2.25
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.01.08 - Evaluate functions for given values of the independent variable.
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.2 SCalc7e Section 1.2
DATE CREATED:	7/20/2015 1:44 PM
DATE MODIFIED:	1/18/2021 10:33 AM

2. Scientists have discovered that a linear relationship exists between the amount of flobberworm mucus secretions and the air temperature. When the temperature is 45°F, the flobberworms each secrete 8.5 grams of mucus a day; when the temperature is 75°F, they each secrete 11.5 grams of mucus a day. Find a function $M(t)$ that gives the amount of mucus secreted on a given day, where t is the temperature of that day in degrees Fahrenheit.

a. $M(t) = 0.1t + 8.5$

b. $M(t) = 10t + 8.5$

c. $M(t) = 10t + 4$

d. $M(t) = 0.1t + 4$

ANSWER:	d
POINTS:	1

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1.2 Mathematical Models: A Catalog of Essential Functions

DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.2.15a SCalc7e 1.2.15a
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.01.11 - Express a function algebraically, given its verbal or numerical representation.
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.2 SCalc7e Section 1.2
DATE CREATED:	7/20/2015 1:44 PM
DATE MODIFIED:	7/20/2015 1:44 PM

3. The relationship between the Fahrenheit and Celsius temperature scales is given by the linear function.

$$F = \frac{9}{5}C + 32$$

What is the F-intercept and what does it represent?

a. $\frac{9}{5}$, Fahrenheit temperature corresponding to 0°C

b. $\frac{9}{5}$, Celsius temperature corresponding to 32°C

c. 32, Celsius temperature corresponding to 0°F

d. 0, Fahrenheit temperature corresponding to 32°C

e. 32, Fahrenheit temperature corresponding to 0°C

ANSWER:	e
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.2.13a SCalc7e 1.2.13a
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	False
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.02.01.06 - Find the zeros of a polynomial function algebraically.
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.2 SCalc7e Section 1.2
DATE CREATED:	7/20/2015 1:44 PM
DATE MODIFIED:	1/29/2020 3:43 AM

4. The monthly cost of driving a car depends on the number of miles driven. Julia found that in October it cost her \$300 to drive 400 mi and in July it cost her \$450 to drive 700 mi. Express the monthly cost C as a function of the distance driven d assuming that a linear relationship gives a suitable model.

a. $C = -100d + 0.5$

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b. $C = 100d - 0.5$
c. $C = 0.5d + 100$
d. $C = 2d + 100$
e. $C = 0.5d - 100$

ANSWER:	c
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.2.18 SCalc7e 1.2.18
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.01.11 - Express a function algebraically, given its verbal or numerical representation.
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.2 SCalc7e Section 1.2
DATE CREATED:	7/20/2015 1:44 PM
DATE MODIFIED:	7/20/2015 1:44 PM

5. Classify the function as a Polynomial function, a Rational function, an algebraic function, or other.

$f(x) = x^9 + 4x^6 - 6$

a. Other
b. Algebraic
c. Polynomial
d. Rational

ANSWER:	c
POINTS:	1
DIFFICULTY:	Easy
REFERENCES:	SCalcET7 1.2.1 SCalc7e 1.2.1
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.02.01.01 - Define polynomial function.
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.2 SCalc7e Section 1.2
DATE CREATED:	7/20/2015 1:44 PM
DATE MODIFIED:	2/17/2020 2:11 AM

6. It makes sense that the larger the area of a region, the larger the number of species that inhabit the region. Many ecologists have modeled the species-area relation with a power function and, in particular, the number of species S of bats living in caves in central Mexico has been related to the surface area A measured in m^2 of the caves by the equation

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1.2 Mathematical Models: A Catalog of Essential Functions

$S = 0.7A^{0.3}$

(a) The cave called mission impossible near puebla, mexico, has suface area of $A = 60m^2$.
How many species of bats would expect to find in that cave?

(b) If you discover that 5 species of bats live in cave estimate the area of the cave.

ANSWER: a) 2 species
b) $702\ m^2$

POINTS: 1
DIFFICULTY: Medium
REFERENCES: SCalcET7 1.2.26 SCalc7e 1.2.26
QUESTION TYPE: Numeric Response
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.01.01.08 - Evaluate functions for given values of the independent variable.
OTHER: Numerical Response
NOTES: SCalcET7 Section 1.2 SCalc7e Section 1.2
DATE CREATED: 7/20/2015 1:44 PM
DATE MODIFIED: 4/27/2022 1:51 PM

7. The relationship between the Fahrenheit and Celsius temperature scales is given by the linear function.

$$F = \frac{9}{5}C + 32$$

Complete the table and find the slope. Round your answers to the nearest whole number.

°C	**°F**
15	
–15	
slope	

ANSWER: (15, 59), (–15, 5); slope = 2

POINTS: 1
DIFFICULTY: Medium
REFERENCES: SCalcET7 1.2.13b SCalc7e 1.2.13b
QUESTION TYPE: Numeric Response
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.01.02.11 - Solve applied problems involving rates of change.
OTHER: Numerical Response
NOTES: SCalcET7 Section 1.2 SCalc7e Section 1.2

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8. Find the domain of the function

$$f(x) = \frac{1}{\sqrt{3} - 2\cos x}$$

a. $x \neq \frac{\pi}{6} + 2\pi n$ and $x \neq \frac{11\pi}{6} + 2\pi n$, where n is any integer

b. $x \neq \frac{11\pi}{6}$ and $x \neq \frac{11\pi}{6}$

c. $x \neq \frac{5\pi}{6} + 2\pi n$ and $x \neq \frac{7\pi}{6} + 2\pi n$, where n is any integer

d. $x \neq \frac{5\pi}{6}$ and $x \neq \frac{7\pi}{6}$

e. $x \neq \frac{\pi}{4} + 2\pi n$ and $x \neq \frac{7\pi}{4} + 2\pi n$, where n is any integer

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.01.01.02 - Define domain of a function.
DATE CREATED: 3/22/2016 9:17 AM
DATE MODIFIED: 2/5/2021 9:41 AM

9. If the recommended adult dosage for a drug is D (in mg), then to determine the appropriate dosage c for a child of age a, pharmacists use the equation $c = 0.04D(a+1)$. Suppose the dosage for an adult is 900 mg. What is the slope of the graph of c and what does it represent?

a. 36 mg/yr; the rate of change of dosage with respect to age
b. 36 yr/mg; the rate of change of age with respect to dosage
c. 0.04 mg/yr; the rate of change of dosage with respect to age
d. 0.04 mg/yr; the rate of change of age with respect to dosage
e. 36 mg; the dosage for a newborn

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.01.02.11 - Solve applied problems involving rates of change.
DATE CREATED: 3/23/2016 1:57 AM
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10. Biologists have noticed that the chirping rate of crickets of a certain species is related to temperature, and the

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relationship appears to be very nearly linear. A cricket produces 108 chirps per minute at 70°F and 228 chirps per minute at 90°F. Find a linear equation that models the temperature T as a function of the number of chirps per minute N.

a. $T(N) = \frac{1}{6}N + \frac{312}{6}$

b. $T(N) = \frac{1}{6}N - \frac{312}{6}$

c. $T(N) = 6N - 648$

d. $N(T) = 6T - 312$

e. $N(T) = -6T + 312$

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.01.01.11 - Express a function algebraically, given its verbal or numerical representation.
DATE CREATED: 3/23/2016 2:10 AM
DATE MODIFIED: 1/29/2020 6:21 AM

11. Classify the following function:
$f(x) = x^6(9x^4 - 4)$

a. Polynomial function
b. Power function
c. Trigonometric function
d. Rational Function
e. Exponential function

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.02.01.01 - Define polynomial function.
DATE CREATED: 3/23/2016 2:28 AM
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12. For the scatter plot below, what type of function might you see as a model for the data?

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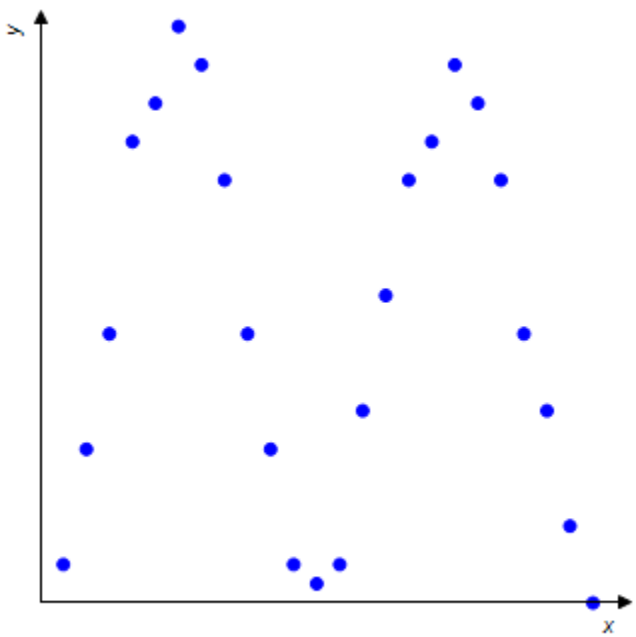

a. Trigonometric function
b. Rational Function
c. Exponential Function
d. Power Function
e. Polynomial Function

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.01.03.01 - Identify graphs and properties of common functions.
DATE CREATED: 3/23/2016 2:32 AM
DATE MODIFIED: 2/10/2020 2:17 AM

13. Find an equation for the family of linear functions such that $f(6)=5$.

a. $f(x)=5+m(x-6)$
b. $f(x)=m(x-6)-5$
c. $f(x)=6+m(x-5)$
d. $f(x)=m(x+5)-5$
e. $f(x)=mx+6m-5$

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice

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HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.01.01.11 - Express a function algebraically, given its verbal or numerical representation.
DATE CREATED: 3/23/2016 2:35 AM
DATE MODIFIED: 1/31/2020 12:37 AM

14. The manager of a weekend flea market knows from past experience that if he charges x dollars for a rental space at the market, then the number y of spaces he can rent is given by the equation $y = 560 - 8x$. What does the x-intercept indicate?

a. There will be no spaces occupied when the rental cost is $70.
b. There will be no spaces occupied when the rental cost is $560.
c. There will be 560 spaces occupied when there is no rental cost.
d. There will be 8 spaces occupied when there is no rental cost.
e. The number of occupied spaces decreases by 5 for every $1 increase in rent.

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.01.01.10 - Express a function verbally, given its numerical or algebraic representation.
DATE CREATED: 3/23/2016 2:39 AM
DATE MODIFIED: 1/29/2020 6:55 AM

15. At the surface of the ocean, the water pressure is the same as the air pressure above the water, $13\ \text{lb}/\text{in}^2$. Below the surface, the water pressure increases by $4.34\ \text{lb}/\text{in}^2$ for every 10 ft of descent. At approximately what depth is the pressure $120\ \text{lb}/\text{in}^2$?

a. 247 ft
b. 276 ft
c. 30 ft
d. 56 ft
e. 359 ft

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.01.01.12 - Express a function numerically, given its verbal, algebraic,or graphical representation.
DATE CREATED: 3/23/2016 2:46 AM
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16. What is the equation of this graph?

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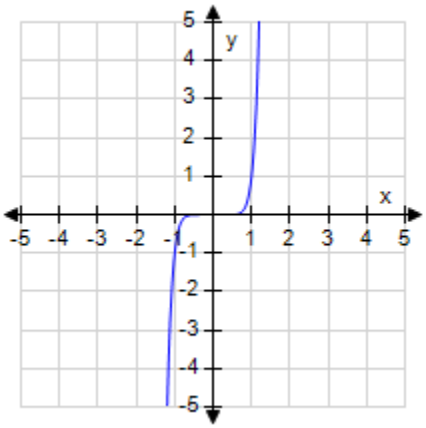

a. $y = x^4$

b. $y = x^8$

c. $y = x^{10}$

d. $y = \sqrt[3]{x}$

e. $y = x^9$

ANSWER:	e
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.40 SCalc7e 1.1.40
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.02.01.10 - Write an equation for a polynomial function, given its graph.
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.1 SCalc7e 1.1.40
DATE CREATED:	7/20/2015 1:44 PM
DATE MODIFIED:	7/31/2020 9:16 AM

17. Find the domain of the function.

$$f(x) = \frac{7x+5}{x^2}$$

a. $(-\infty, 0)$

b. $\left(-\infty, -\frac{5}{7}\right) \cup \left(-\frac{5}{7}, \infty\right)$

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c. $\left(-\infty, \frac{5}{7}\right] \cup \left[\frac{5}{7}, \infty\right)$

d. $(-\infty, 0) \cup (0, \infty)$

ANSWER: d
POINTS: 1
DIFFICULTY: Easy
REFERENCES: SCalcET7 1.1.31 SCalc7e 1.1.31
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
STUDENT ENTRY MODE: Basic
LEARNING OBJECTIVES: PCALC.COH.LO.01.01.07 - Find the domain of a function algebraically.
OTHER: Bimodal
NOTES: SCalcET7 Section 1.1 SCalc7e Section 1.1
DATE CREATED: 7/20/2015 1:44 PM
DATE MODIFIED: 1/29/2020 4:08 AM

18. Find the domain of the function $f(x) = \frac{x}{7\sin x - 8}$

a. $(-\infty, \infty)$

b. $\left[\frac{8}{7}, \infty\right)$

c. $[-8, 7]$

d. $[-7, 8]$

ANSWER: a
POINTS: 1
DIFFICULTY: Easy
REFERENCES: SCalcET7 1.1.32 SCalc7e 1.1.32
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
STUDENT ENTRY MODE: Basic
LEARNING OBJECTIVES: PCALC.COH.LO.01.01.07 - Find the domain of a function algebraically.
OTHER: Bimodal
NOTES: SCalcET7 Section 1.1 SCalc7e Section 1.1
DATE CREATED: 7/20/2015 1:44 PM
DATE MODIFIED: 2/10/2020 5:53 AM

19. Find a, such that the function $f(x) = 4x + \sqrt{a - x^2}$ has the domain $[-3, 3]$.

a. $a = -9$

b. $a = \sqrt{3}$

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c. $a = -\sqrt{3}$

d. $a = 9$

e. $a = 3$

ANSWER: d
POINTS: 1
DIFFICULTY: Medium
REFERENCES: SCalcET7 1.1.38 SCalc7e 1.1.38
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
STUDENT ENTRY MODE: Basic
LEARNING OBJECTIVES: PCALC.COH.LO.01.01.07 - Find the domain of a function algebraically.
OTHER: Bimodal
NOTES: SCalcET7 Section 1.1 SCalc7e Section 1.1
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20. Find the domain.

$g(u) = \sqrt{u} - \sqrt{3-u}$

a. $(0, 3)$

b. $(-\infty, 0]$

c. $(-3, \infty]$

d. $[0, 3]$

e. $[0, \infty)$

ANSWER: d
POINTS: 1
DIFFICULTY: Medium
REFERENCES: SCalcET7 1.1.34 SCalc7e 1.1.34
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
STUDENT ENTRY MODE: Basic
LEARNING OBJECTIVES: PCALC.COH.LO.01.01.07 - Find the domain of a function algebraically.
OTHER: Bimodal
NOTES: SCalcET7 Section 1.1 SCalc7e Section 1.1
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21. Find the range of the function.

$y = 4 + \cos x$

a. $(-\infty, \infty)$

b. $(2, \infty)$

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c. [–1, 1]
d. (–1, 3)
e. [3, 5]

ANSWER: e
POINTS: 1
DIFFICULTY: Medium
REFERENCES: SCalcET7 1.1.38 SCalc7e 1.1.38
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
STUDENT ENTRY MODE: Basic
LEARNING OBJECTIVES: PCALC.COH.LO.05.04.03 - Find the domain and range of the cosine function.
OTHER: Bimodal
NOTES: SCalcET7 Section 1.1 SCalc7e Section 1.1
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DATE MODIFIED: 7/20/2015 1:44 PM

22. Find the domain of the function.

$$f(x) = \frac{7}{3x-1}$$

ANSWER: $\left\{x \middle| x \neq \frac{1}{3}\right\}$

POINTS: 1
DIFFICULTY: Medium
REFERENCES: SCalcET7 1.1.31 SCalc7e 1.1.31
QUESTION TYPE: Numeric Response
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.01.01.07 - Find the domain of a function algebraically.
OTHER: Numerical Response
NOTES: SCalcET7 Section 1.1 SCalc7e Section 1.1
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23. Find the domain of the function.

$$f(x) = \sqrt{25 - x^2}$$

ANSWER: [–5, 5]

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POINTS: 1
DIFFICULTY: Medium
REFERENCES: SCalcET7 1.1.38 SCalc7e 1.1.38
QUESTION TYPE: Numeric Response
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.01.01.07 - Find the domain of a function algebraically.
OTHER: Numerical Response
NOTES: SCalcET7 Section 1.1 SCalc7e Section 1.1
DATE CREATED: 7/20/2015 1:44 PM
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24. Find the range of the function.

$h(x) = \sqrt{36 - x^2}$

ANSWER: $0 \le h(x) \le 6$
POINTS: 1
DIFFICULTY: Medium
REFERENCES: SCalcET7 1.1.38 SCalc7e 1.1.38
QUESTION TYPE: Numeric Response
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.01.01.03 - Define range of a function.
KEYWORDS: 7ET
OTHER: Numerical Response
NOTES: SCalcET7 Section 1.1 SCalc7e Section 1.1
DATE CREATED: 7/20/2015 1:44 PM
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25. It makes sense that the larger the area of a region, the larger the number of species that inhabit the region. Many ecologists have modeled the species-area relation with a power function. In particular, the number of species S of bats living in caves in central Mexico has been related to the surface area A of the caves by the equation $S = 0.7A^{0.3}$. If you discover that nine species of bats live in a cave, estimate the area of the cave.

a. $4979\ \text{m}^2$
b. $1.35\ \text{m}^2$
c. $2125\ \text{m}^2$
d. $2.15\ \text{m}^2$

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.01.01.08 - Evaluate functions for given values of the independent

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variable.

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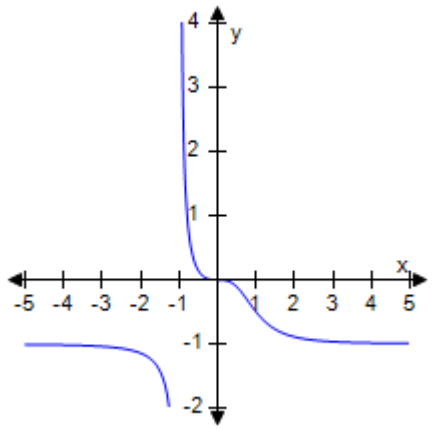
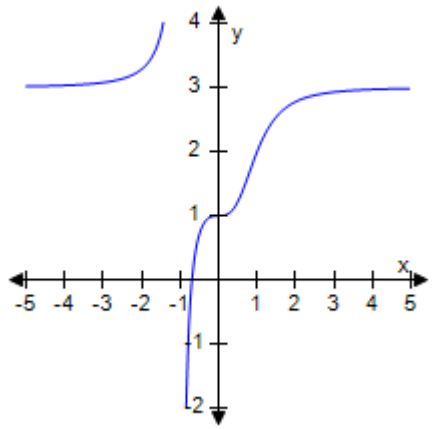
26. Plot the graph of the function f in an appropriate viewing window.

$$f(x) = \frac{x^3}{x^3+1}$$

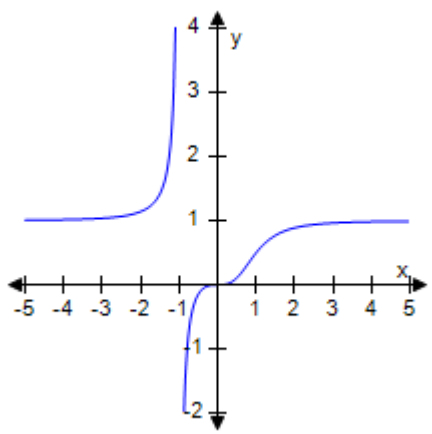
a.



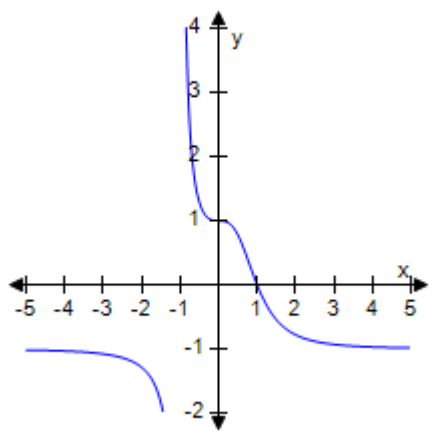
b.



c.



d.



ANSWER: c
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 2.3.50a
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
STUDENT ENTRY MODE: Basic
LEARNING OBJECTIVES: PCALC.COH.LO.02.04.11 - Sketch graphs of rational functions using intercepts, asymptotes, zeros, and test values.

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1.2 Mathematical Models: A Catalog of Essential Functions

KEYWORDS: 7e
OTHER: Bimodal
NOTES: Section 2.3
DATE CREATED: 7/20/2015 3:55 PM
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27. Identify the type of the following function.

$h(r) = 3.6^r$

a. power function
b. root function
c. polynomial
d. rational function
e. algebraic function
f. trigonometric function
g. exponential function
h. logarithmic function

ANSWER: g
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.03.01.01 - Define exponential function.
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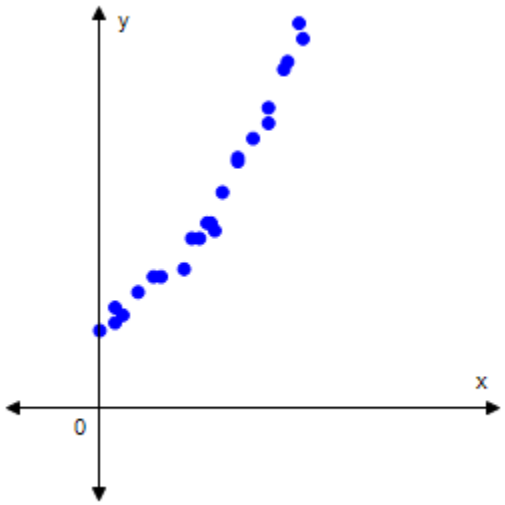
28. Decide what type of function you might choose as a model for the data displayed on the scatter plot.



a. exponential function
b. logarithmic function
c. polynomial
d. rational function
e. trigonometric function

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1.2 Mathematical Models: A Catalog of Essential Functions

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.03.01.01 - Define exponential function.
DATE CREATED: 2/12/2021 5:12 AM
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29. Determine the domain and range of the function $f(x) = 3^x$.

a. Domain: $(-\infty, \infty)$, range: $(0, \infty)$
b. Domain: $(0, \infty)$, range: $(-\infty, \infty)$
c. Domain: $(0, \infty)$, range: $(0, \infty)$
d. Domain: $(-\infty, \infty)$, range: $(-\infty, \infty)$
e. Domain: $(-\infty, \infty)$, range: $(3, \infty)$
f. Domain: $(3, \infty)$, range: $(-\infty, \infty)$

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.03.01.04 - Find the domain and range of exponential functions.
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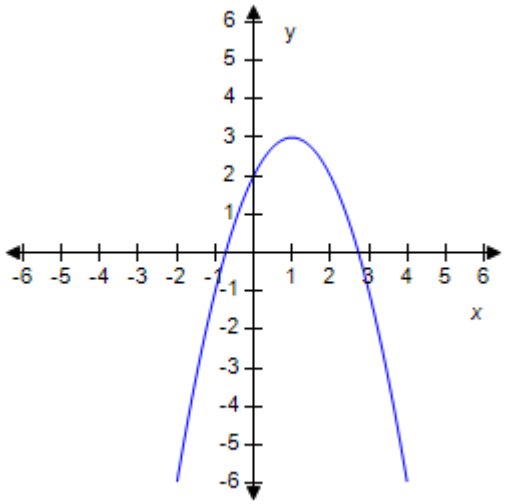
1.3 New Functions from Old Functions

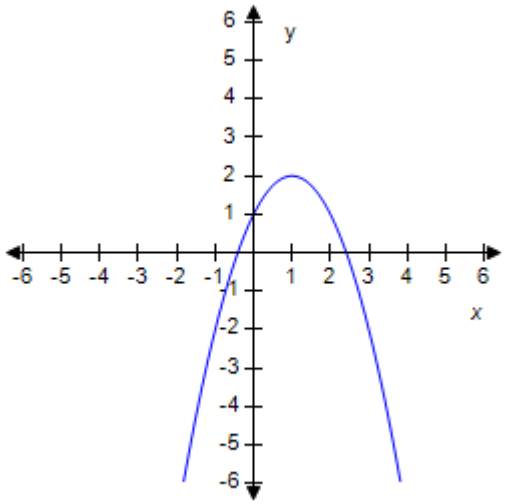
1. Graph the function by hand, not by plotting points, but by starting with the graph of one of the standard functions and then applying the appropriate transformations.

$y = 3 + 2x - x^2$

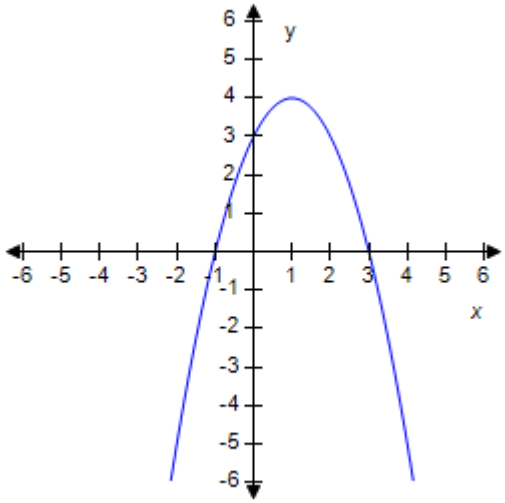
a.



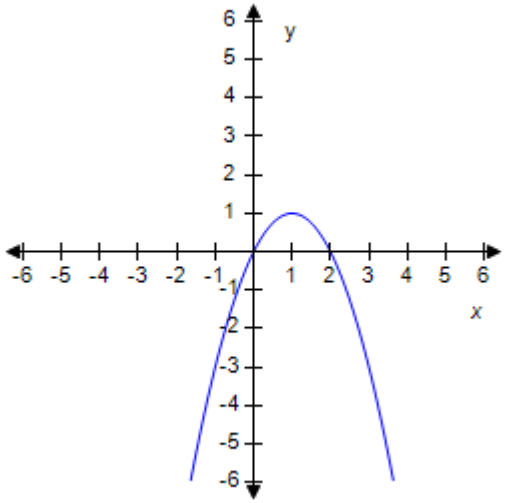
b.



c.



d.



ANSWER:	c
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.3.12 SCalc7e 1.3.12
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.03.11 - Sketch the transformed graph of a function, given its transformed equation.

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1.3 New Functions from Old Functions

OTHER: Bimodal
NOTES: SCalcET7 Section 1.3 SCalc7e Section 1.3
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2. If $f(x) = x + 15$ and $h(x) = 4x + 85$, find a function g such that $g \circ f = h$.

a. $g(x) = 4x + 25$
b. $g(x) = 4x$
c. $g(x) = x - 25$
d. $g(x) = 4x - 25$
e. $g(x) = x + 25$

ANSWER: a
POINTS: 1
DIFFICULTY: Medium
REFERENCES: SCalcET7 1.3.61b SCalc7e 1.3.61b
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
STUDENT ENTRY MODE: Basic
LEARNING OBJECTIVES: PCALC.COH.LO.01.06.06 - Combine functions using function composition.
OTHER: Bimodal
NOTES: SCalcET7 Section 1.3 SCalc7e Section 1.3
DATE CREATED: 7/20/2015 1:45 PM
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3. Use the table to evaluate the expression $(f \circ g)(4)$.

x	1	2	3	4	5	6
$f(x)$	3	2	1	0	1	2
$g(x)$	6	5	2	3	4	6

a. 4
b. 1
c. 2
d. 3
e. 5

ANSWER: b
POINTS: 1
DIFFICULTY: Medium
REFERENCES: SCalcET7 1.3.50f SCalc7e 1.3.50f
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
STUDENT ENTRY MODE: Basic
LEARNING OBJECTIVES: PCALC.COH.LO.01.06.06 - Combine functions using function composition.

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1.3 New Functions from Old Functions

OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.3 SCalc7e Section 1.3
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4. What is $\sqrt[10]{x}$, given that $H = h \circ f \circ g$ and $H(x) = \sqrt[10]{\sqrt{x} - 3}$?

a. $g(x)$
b. $f(x)$
c. $h(x)$

ANSWER:	c
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.3.47 SCalc7e 1.3.47
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.06.08 - Identify the functions that make up a composite function.
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.3 SCalc7e Section 1.3
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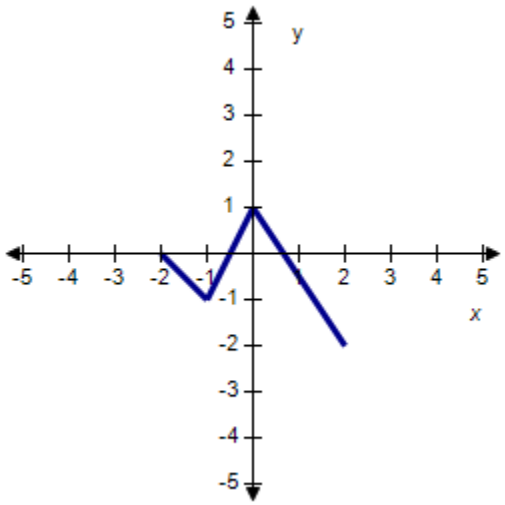
5. The graph of the function f follows. Choose the graph of $y = -f(x) - 1$.



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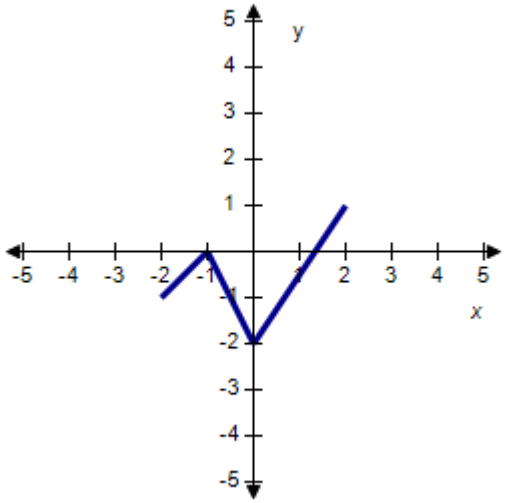
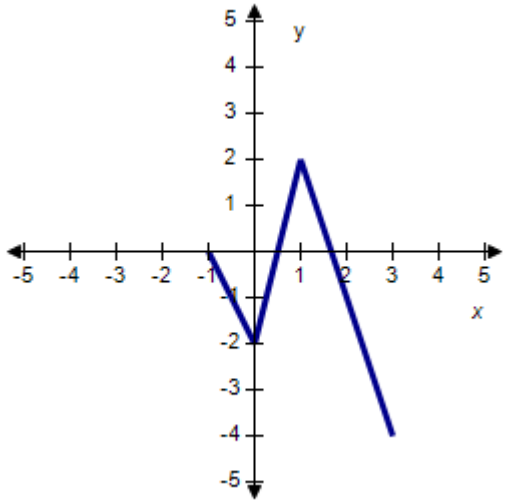
1.3 New Functions from Old Functions

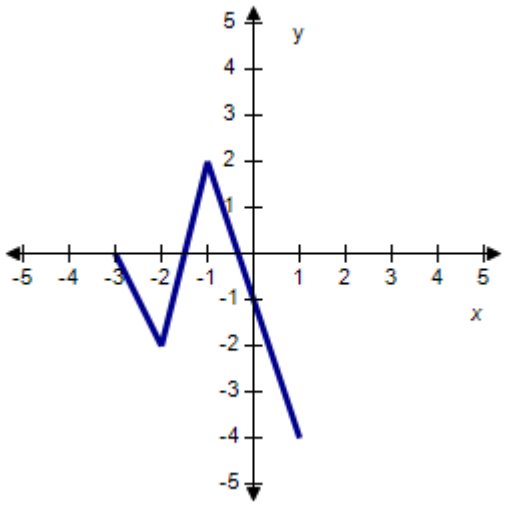
a.



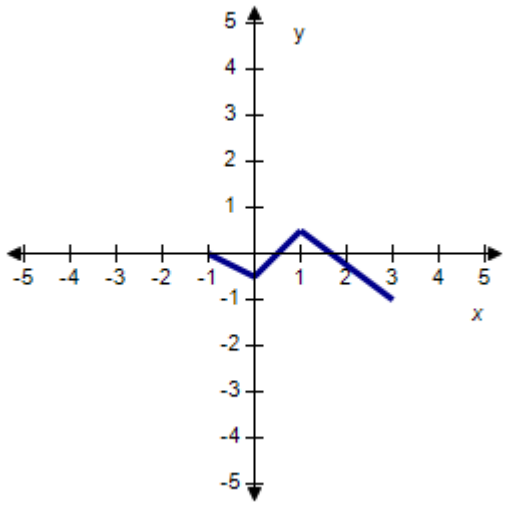
b.



c.



d.



ANSWER:	a
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.3.5b SCalc7e 1.3.5b
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.03.11 - Sketch the transformed graph of a function, given its transformed equation.
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.3 SCalc7e Section 1.3
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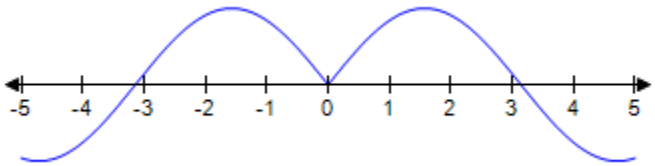
1.3 New Functions from Old Functions

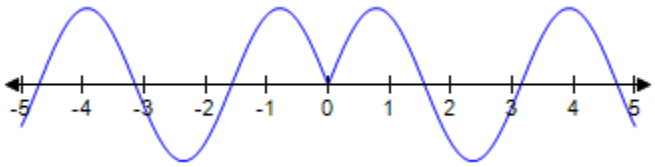
6. Which of the following graphs is the graph of the function?

$f(x) = \sin|2x|$

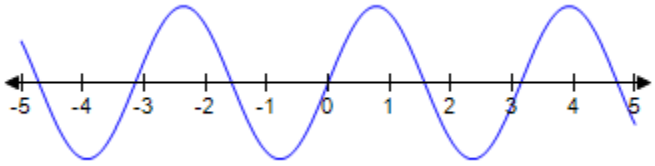
Graph 1



Graph 2



Graph 3



a. Graph 2
b. Graph 1
c. Graph 3

ANSWER:	a
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.3.24 SCalc7e 1.3.24
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.03.11 - Sketch the transformed graph of a function, given its transformed equation.
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.3 SCalc7e Section 1.3
DATE CREATED:	7/20/2015 1:45 PM
DATE MODIFIED:	2/5/2020 8:03 AM

7. The graph of the function *f* follows. Choose the graph of $y = f(|x|)$.

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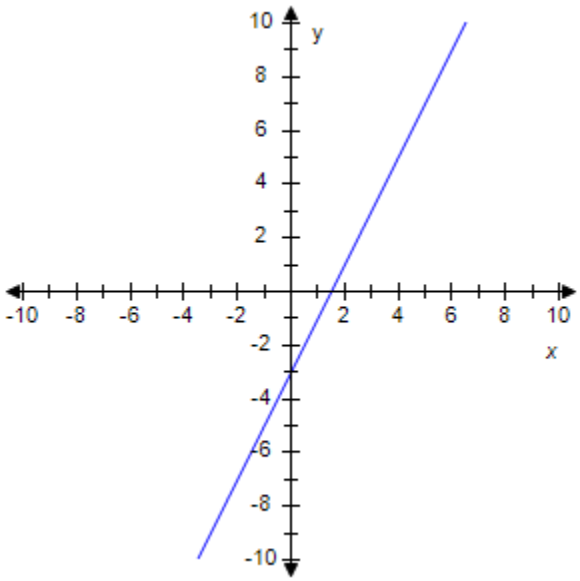
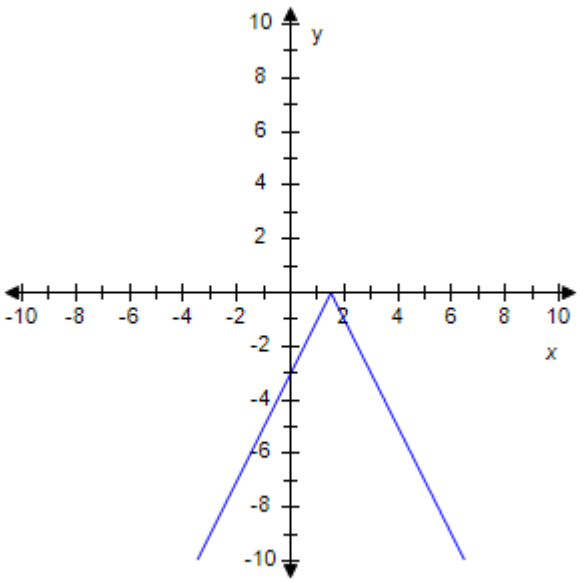
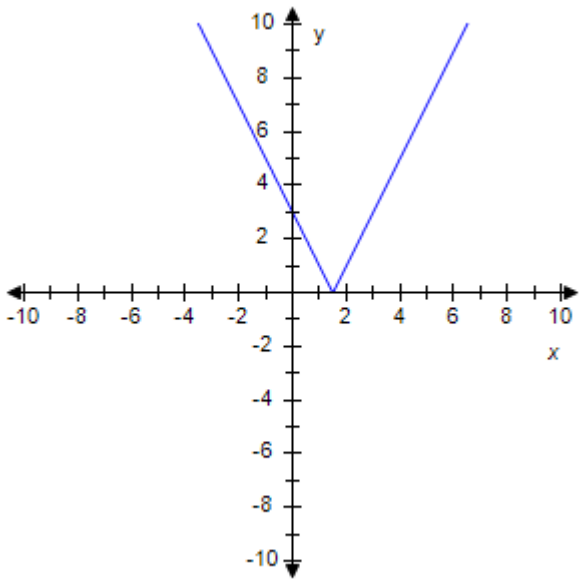
1.3 New Functions from Old Functions



a.

b.





c.

d.

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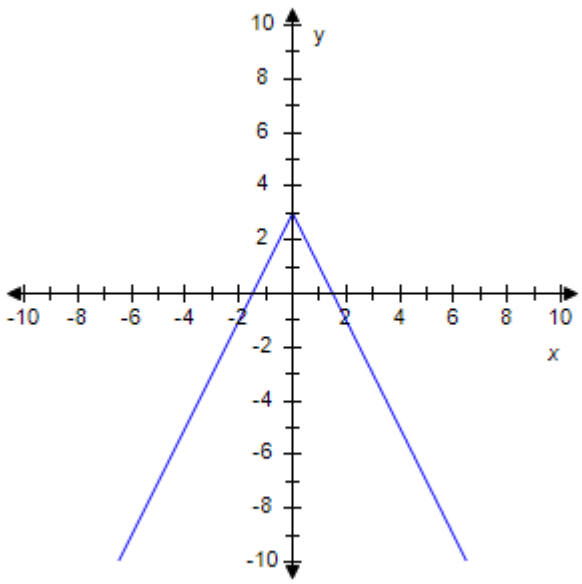

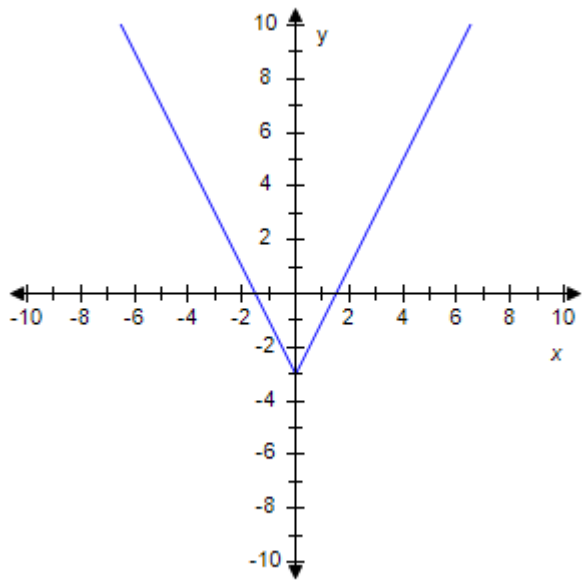

ANSWER:	d
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.3.27a SCalc7e 1.3.27a
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.03.11 - Sketch the transformed graph of a function, given its transformed equation.
OTHER:	Bimodal
NOTES:	SCalcET7 Section 1.3 SCalc7e Section 1.3
DATE CREATED:	7/20/2015 1:45 PM
DATE MODIFIED:	3/4/2020 4:11 AM

8. Suppose that the graph of f is given. Describe how the graph of the function $y = f(x - 3) - 3$ can be obtained from the graph of f.

a. Shift the graph 3 units to the left and 3 units down.
b. Shift the graph 3 units to the left and 3 units up.
c. Shift the graph 3 units to the right and 3 units up.
d. Shift the graph 3 units to the right and 3 units down.
e. None of these

ANSWER:	d
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.3.1bc SCalc7e 1.3.1bc
QUESTION TYPE:	Multi-Mode (Multiple choice)

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1.3 New Functions from Old Functions

HAS VARIABLES: True
STUDENT ENTRY MODE: Basic
LEARNING OBJECTIVES: PCALC.COH.LO.01.03.10 - Describe the transformations applied tthe graph of a function, given its transformed equation.
OTHER: Bimodal
NOTES: SCalcET7 Section 1.3 SCalc7e Section 1.3
DATE CREATED: 7/20/2015 1:45 PM
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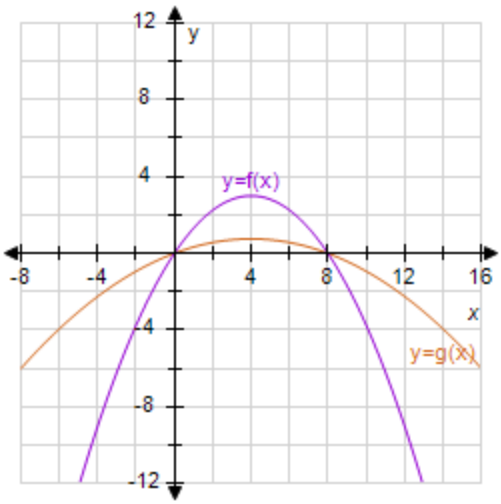
9. Which of the following is the equation for the function $g(x)$?



a. $g(x) = 4f(x)$
b. $g(x) = f(x) - 4$
c. $g(x) = -f(x+4)$
d. $g(x) = \dfrac{f(x)}{4}$
e. $g(x) = -f(x) + 4$

ANSWER: d
POINTS: 1
DIFFICULTY: Medium
REFERENCES: SCalcET7 1.3.3c SCalc7e 1.3.3c
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
STUDENT ENTRY MODE: Basic
LEARNING OBJECTIVES: PCALC.COH.LO.01.03.14 - Write an equation for a given transformed graph of a common function.
OTHER: Bimodal
NOTES: SCalcET7 Section 1.3 SCalc7e Section 1.3
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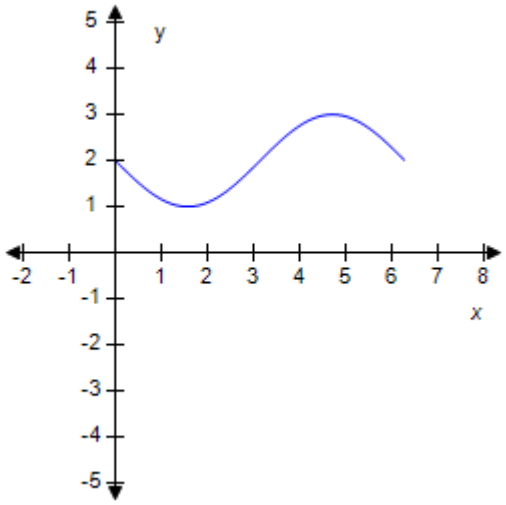
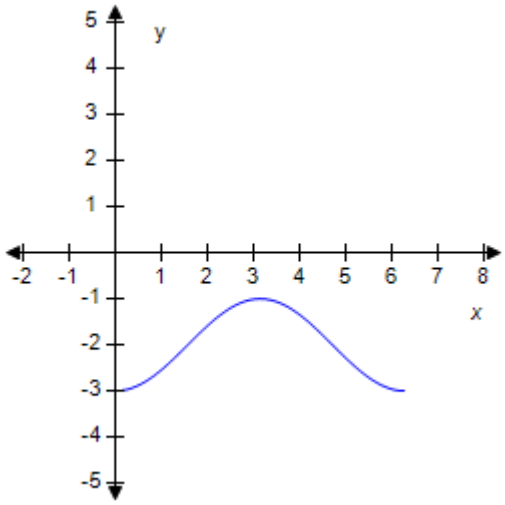
10. Sketch the graph of $y = 2 - \cos x$ over one period.

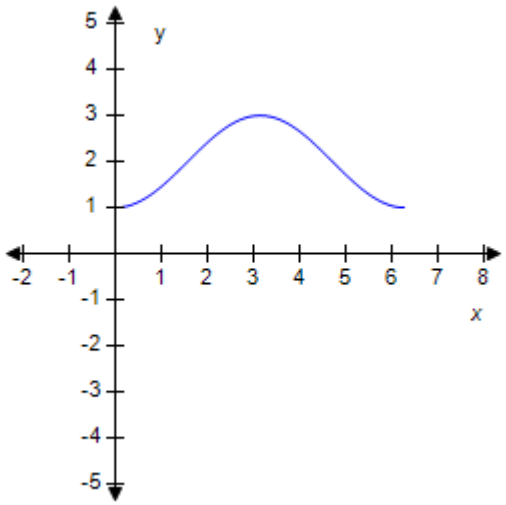
a.



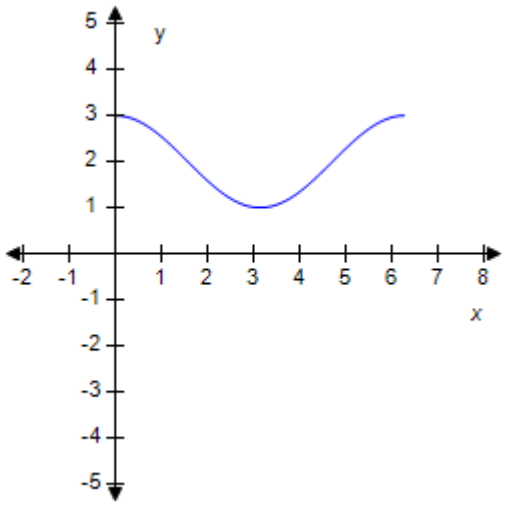
b.



c.



d.



ANSWER: c
POINTS: 1
DIFFICULTY: Easy
REFERENCES: SCalcET7 1.3.27b SCalc7e 1.3.27b
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
STUDENT ENTRY MODE: Basic
LEARNING OBJECTIVES: PCALC.COH.LO.01.03.11 - Sketch the transformed graph of a function, given its transformed equation.

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1.3 New Functions from Old Functions

OTHER: Bimodal
NOTES: SCalcET7 Section 1.3 SCalc7e Section 1.3
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11. Find the function $f \circ g$ and its domain if $f(x) = \sqrt{x+6}$ and $g(x) = \sqrt{x-6}$.

a. $\sqrt{x^2-36}$
$D = [6, \infty)$
b. $\sqrt{x^2-36}$
$D = [-6, \infty)$
c. $\sqrt{x^2+36}$
$D = [-6, \infty)$
d. $\sqrt{x^2+36}$
$D = [6, \infty)$

ANSWER: a
POINTS: 1
DIFFICULTY: Easy
REFERENCES: SCalcET7 1.3.29 SCalc7e 1.3.29
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.01.06.07 - Find the domain of a composite function.
OTHER: Bimodal
NOTES: SCalcET7 Section 1.3 SCalc7e Section 1.3
DATE CREATED: 7/20/2015 1:45 PM
DATE MODIFIED: 1/18/2021 10:56 AM

12. Find the function $f \circ g$ and its domain if $f(x) = \frac{x-1}{x}$ and $g(x) = \frac{x}{x+5}$.

a. $\frac{x-1}{x+5}, D = (-\infty, -5) \cup (-5, 0) \cup (0, \infty)$

b. $\frac{x-1}{x+5}, D = (-\infty, -5) \cup (-5, \infty)$

c. $-\frac{5}{x}, D = (-\infty, -5) \cup (-5, 0) \cup (0, \infty)$

d. $-\frac{5}{x}, D = (-\infty, 0) \cup (0, \infty)$

ANSWER: c
POINTS: 1
DIFFICULTY: Medium

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1.3 New Functions from Old Functions

REFERENCES: SCalcET7 1.3.35a SCalc7e 1.3.35a
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.01.06.07 - Find the domain of a composite function.
OTHER: Bimodal
NOTES: SCalcET7 Section 1.3 SCalc7e Section 1.3
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13. The graph of the function $f(x) = x^2 - 8x + 4$ has been shifted horizontally to the left by 9 units. Find the function for the transformed graph.

a. $g(x) = x^2 - 8x - 5$

b. $g(x) = x^2 - 8x + 13$

c. $g(x) = x^2 + 10x + 13$

d. $g(x) = x^2 - 26x + 157$

ANSWER: c
POINTS: 1
DIFFICULTY: Medium
REFERENCES: SCalcET7 1.3.1g SCalc7e 1.3.1g
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
STUDENT ENTRY MODE: Basic
LEARNING OBJECTIVES: PCALC.COH.LO.01.03.13 - Write an equation for the transformed graph of a function, given its verbal description.
OTHER: Bimodal
NOTES: SCalcET7 Section 1.3 SCalc7e Section 1.3
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14. Express the function in the form of $f \circ g \circ h$.

$H(x) = 3 - 5^{x^3}$

ANSWER: $h(x) = x^3,\ g(x) = 5^x,\ f(x) = 3 - x$

POINTS: 1
DIFFICULTY: Medium
REFERENCES: SCalcET7 1.3.48 SCalc7e 1.3.48
QUESTION TYPE: Numeric Response

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1.3 New Functions from Old Functions

HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.01.06.08 - Identify the functions that make up a composite function.
OTHER: Numerical Response
NOTES: SCalcET7 Section 1.3 SCalc7e Section 1.3
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15. A spherical balloon with radius r inches has volume $4\frac{\pi r^3}{3}$.

Find a function that represents the amount of air required to inflate the balloon from a radius of r inches to a radius of $r + 2$ inches.

ANSWER: $\frac{8}{3}\pi(6r^2+12r+8)$

POINTS: 1
DIFFICULTY: Medium
REFERENCES: SCalcET7 1.3.54 SCalc7e 1.3.54
QUESTION TYPE: Numeric Response
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.01.03.13 - Write an equation for the transformed graph of a function, given its verbal description.
OTHER: Numerical Response
NOTES: SCalcET7 Section 1.3 SCalc7e Section 1.3
DATE CREATED: 7/20/2015 1:45 PM
DATE MODIFIED: 2/5/2020 8:53 AM

16. Express the function in the form of $f \circ g$.

$v(t) = \tan(t^2)\sin(t^2)$

ANSWER: $f(t) = \tan(t)\sin(t)$
$g(t) = t^2$

POINTS: 1
DIFFICULTY: Medium
REFERENCES: SCalcET7 1.3.45 SCalc7e 1.3.45
QUESTION TYPE: Numeric Response
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.01.06.08 - Identify the functions that make up a composite function.
OTHER: Numerical Response
NOTES: SCalcET7 Section 1.3 SCalc7e Section 1.3
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1.3 New Functions from Old Functions

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17. A stone is dropped into a lake, creating a circular ripple that travels outward at a speed of 49 cm/s. Express the radius r of this circle as a function of the time t (in seconds) and find $A \circ r$, if A is the area of this circle as a function of the radius.

ANSWER: $r(t) = 49t,\ 2401\pi t^2$

POINTS: 1
DIFFICULTY: Medium
REFERENCES: SCalcET7 1.3.53 SCalc7e 1.3.53
QUESTION TYPE: Numeric Response
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.01.06.09 - Solve applied problems involving combinations of functions.
OTHER: Numerical Response
NOTES: SCalcET7 Section 1.3 SCalc7e Section 1.3
DATE CREATED: 7/20/2015 1:45 PM
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18. Let $f(x) = x^2 - 18x + 81$ and $g(x) = \sqrt{x+1}$. Find $(f \circ f)(12)$.

ANSWER: 0
POINTS: 1
DIFFICULTY: Easy
REFERENCES: SCalcET7 1.3.36 SCalc7e 1.3.36
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: True
STUDENT ENTRY MODE: Basic
LEARNING OBJECTIVES: PCALC.COH.LO.01.06.06 - Combine functions using function composition.
OTHER: Short Answer
NOTES: SCalcET7 Section 1.3 SCalc7e Section 1.3
DATE CREATED: 7/20/2015 1:45 PM
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19. Find $f \circ g \circ h$ if

$f(x) = \sqrt{x},\ g(x) = 3x + 1,$ and $h(x) = x^2 - 1$

ANSWER: $\sqrt{3x^2 - 2}$

POINTS: 1

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1.3 New Functions from Old Functions

DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.3.37 SCalc7e 1.3.37
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.06.06 - Combine functions using function composition.
OTHER:	Short Answer
NOTES:	SCalcET7 Section 1.3 SCalc7e Section 1.3
DATE CREATED:	7/20/2015 1:45 PM
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20. Find the function g such that $h(x) = (g \circ f)(x)$.

$h(x) = \sin^5 x$ and $f(x) = \sin x$

ANSWER: $g(x) = x^5$

POINTS:	1
DIFFICULTY:	Easy
REFERENCES:	SCalcET7 1.3.62 SCalc7e 1.3.62
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.06.08 - Identify the functions that make up a composite function.
OTHER:	Short Answer
NOTES:	SCalcET7 Section 1.3 SCalc7e Section 1.3
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1.4 Exponential Functions

1. Use the Law of Exponents to rewrite and simplify the expression.

$$\frac{\sqrt{a\sqrt{b}}}{\sqrt[6]{ab}}$$

a. $\left(\frac{a}{b}\right)^{\frac{1}{3}}$

b. $\frac{a^{\frac{1}{3}}}{b^{\frac{1}{12}}}$

c. $\frac{a}{b}$

d. $\frac{a}{b^{\frac{1}{12}}}$

e. $a^{\frac{1}{3}}b^{\frac{1}{12}}$

ANSWER:	e
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	1.5.4b
QUESTION TYPE:	Multiple Choice
HAS VARIABLES:	True
LEARNING OBJECTIVES:	PCALC.COH.LO.03.01.01 - Define exponential function.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	Section 1.5
DATE CREATED:	7/20/2015 1:45 PM
DATE MODIFIED:	2/10/2020 5:38 AM

2. Starting with the graph of $y = e^x$, find the equation of the graph that results from reflecting about the line $y = 5$.

a. $y = -e^x$

b. $y = -e^x + 10$

c. $y = -e^{-5x} + 10$

d. $y = e^{-x} + 10$

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e. $y = -e^{x+10}$

ANSWER:	b
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	1.5.18a
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.03.01.06 - Given its graph, write an equation for an exponential function.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	Section 1.5
DATE CREATED:	7/20/2015 1:45 PM
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3. Use the Law of Exponents to rewrite and simplify the expression.

$$\frac{x^{4n} \cdot x^{5n+1}}{x^{n-4}}$$

a. x^{8n+5}

b. x^{8n+6}

c. x^{6n-9}

d. x^{3n+8}

e. x^{4n-7}

ANSWER:	a
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	1.5.4a
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.03.01.01 - Define exponential function.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	Section 1.5
DATE CREATED:	7/20/2015 1:45 PM
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4. Starting with the graph of $y = e^x$, write the equation of the graph that results from shifting 6 units right.

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a. $y = e^{x+6}$

b. $y = e^{x} - 6$

c. $y = e^{x-6}$

d. $y = e^{x} + 6$

e. $y = 6e^{x-6}$

ANSWER: c
POINTS: 1
DIFFICULTY: Medium
REFERENCES: 1.5.18b
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
STUDENT ENTRY MODE: Basic
LEARNING OBJECTIVES: PCALC.COH.LO.03.01.06 - Given its graph, write an equation for an exponential function.
KEYWORDS: 7ET
OTHER: Bimodal
NOTES: Section 1.5
DATE CREATED: 7/20/2015 1:45 PM
DATE MODIFIED: 1/29/2020 4:53 AM

5. The table gives the population of the United States, in millions, for the years 1900 - 2000. Use a graphing calculator with exponential regression capability to model the U.S. population since 1900. Use the model to estimate the population in 1965 and to predict the population in the year 2025.

Year	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000
Population (millions)	76	92	106	123	131	150	179	203	227	250	281

a. 185 million, 400 million

b. 190 million, 405 million

c. 195 million, 410 million

d. 180 million, 395 million

e. 175 million, 390 million

ANSWER: a
POINTS: 1
DIFFICULTY: Medium
REFERENCES: 1.5.32
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
STUDENT ENTRY MODE: Basic
LEARNING OBJECTIVES: PCALC.COH.LO.03.01.10 - Solve applied problems involving exponential functions.

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1.4 Exponential Functions

KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	Section 1.5
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6. Under ideal conditions a certain bacteria population is known to double every three hours. Suppose that there are initially 20 bacteria. What is the size of the population after 15 hours?

a. 1,280 bacteria
b. 80 bacteria
c. 640 bacteria
d. 160 bacteria
e. 320 bacteria

ANSWER:	c
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	1.5.29a
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.03.01.10 - Solve applied problems involving exponential functions.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	Section 1.5
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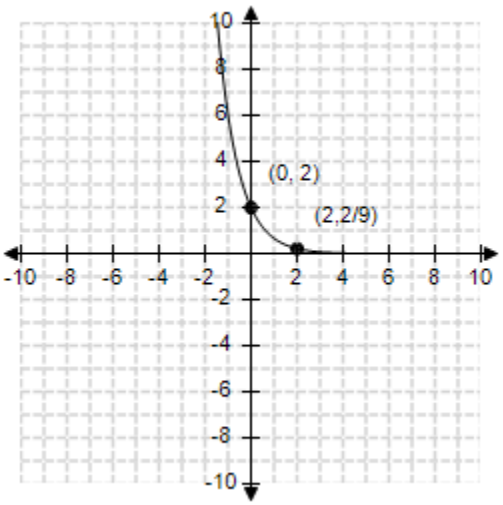
7. Find the exponential function $y = Ca^x$ whose graph is given.



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1.4 Exponential Functions

a. $f(x) = 2\left(\frac{1}{3}\right)^x$

b. $f(x) = 3\left(\frac{1}{3}\right)^x$

c. $f(x) = \left(\frac{3}{2}\right)$

d. $f(x) = \frac{1}{3^x}$

e. $f(x) = \left(\frac{3}{4}\right)^x$

ANSWER:	a
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	1.5.21
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.03.01.06 - Given its graph, write an equation for an exponential function.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	Section 1.5
DATE CREATED:	7/20/2015 1:45 PM
DATE MODIFIED:	2/10/2020 4:47 AM

8. The half-life of bismuth-210, ^{210}Bi, is 5 days. If a sample has a mass of 600 mg, find the amount remaining after 4 weeks. Round your answer to one decimal place.

a. 12.4 mg
b. 29,102 mg
c. 0 mg
d. 82.8 mg
e. 6,000 mg

ANSWER:	a
POINTS:	1
QUESTION TYPE:	Multiple Choice
HAS VARIABLES:	True
LEARNING OBJECTIVES:	PCALC.COH.LO.03.01.10 - Solve applied problems involving exponential functions.

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1.4 Exponential Functions

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9. An isotope of sodium, ^{24}Na, has a half-life of 15 hours. A sample of this isotope has mass 9 g. Estimate the time required for the mass to be reduced to 0.5 g.

a. 62.5 hours
b. 2.1 hours
c. 70.3 hours
d. 47.5 hours
e. 125.1 hours

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.03.01.10 - Solve applied problems involving exponential functions.
DATE CREATED: 3/22/2016 9:32 AM
DATE MODIFIED: 1/18/2021 4:44 AM

10. Find the domain of the following function.

$$f(x) = \frac{1 - e^{x^2}}{1 - e^{36 - x^2}}$$

a. $\mathbb{R}$
b. $x \neq 0$
c. $0 < x < 6$
d. $x \neq \pm 36$
e. $x \neq \pm 6$

ANSWER: e
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.03.01.04 - Find the domain and range of exponential functions.
DATE CREATED: 3/22/2016 9:45 AM
DATE MODIFIED: 1/18/2021 4:43 AM

11. After alcohol is fully absorbed into the body, it is metabolized with a half-life of about 1.25 hours. Suppose you have had three alcoholic drinks and an hour later, at midnight, your blood alcohol concentration (BAC) is 0.6 mg/mL. Find an exponential decay model for your BAC t hours after midnight.

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1.4 Exponential Functions

a. $\text{BAC}(t) = 0.6 \cdot (2)^{-\frac{4t}{5}}$

b. $\text{BAC}(t) = 1.25 \cdot (2)^{-\frac{t}{0.6}}$

c. $\text{BAC}(t) = 0.6 \cdot \left(\frac{1}{2}\right)^{1.25t}$

d. $\text{BAC}(t) = 1.25 \cdot \left(\frac{1}{2}\right)^{0.6t}$

e. None of the above

ANSWER:	a
POINTS:	1
QUESTION TYPE:	Multiple Choice
HAS VARIABLES:	True
LEARNING OBJECTIVES:	PCALC.COH.LO.03.01.10 - Solve applied problems involving exponential functions.
DATE CREATED:	3/22/2016 9:57 AM
DATE MODIFIED:	1/18/2021 4:44 AM

12. Determine the range of the following function.

$g(x) = -2^{-x} - 9$

a. $(-\infty, -9)$
b. $(9, \infty)$
c. $\mathbb{R}$
d. $(-9, \infty)$
e. $(0, -\infty)$

ANSWER:	a
POINTS:	1
QUESTION TYPE:	Multiple Choice
HAS VARIABLES:	True
LEARNING OBJECTIVES:	PCALC.COH.LO.03.01.04 - Find the domain and range of exponential functions.
DATE CREATED:	3/22/2016 10:11 AM
DATE MODIFIED:	1/18/2021 4:44 AM

13. Use the Law of Exponents to rewrite and simplify the expression.

$$\frac{(4z^8)^8}{2z^9}$$

a. $32{,}768z^{55}$

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b. $65{,}536z^{55}$

c. $32{,}768z^{8}$

d. $2z^{55}$

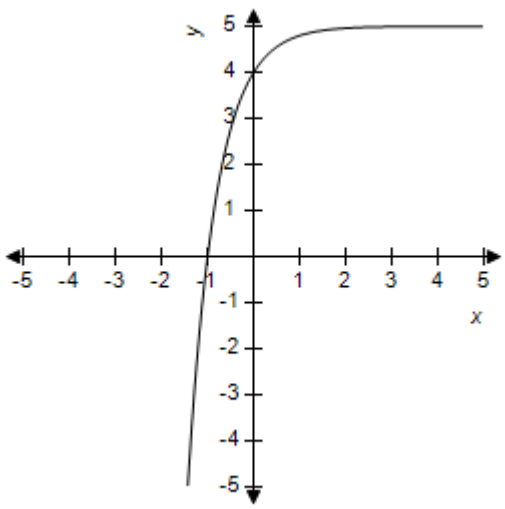
e. $2z^{8}$

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.03.01.01 - Define exponential function.
DATE CREATED: 3/22/2016 10:17 AM
DATE MODIFIED: 1/29/2020 5:50 AM

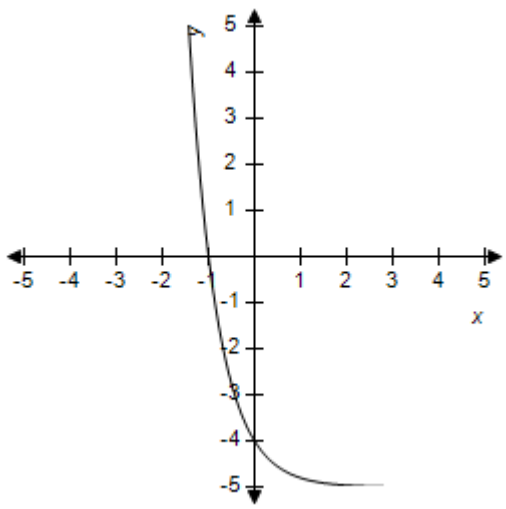
14. Identify the graph of the following function.

$y = 5 - (0.2)^x$

a.



b.



c.

d.

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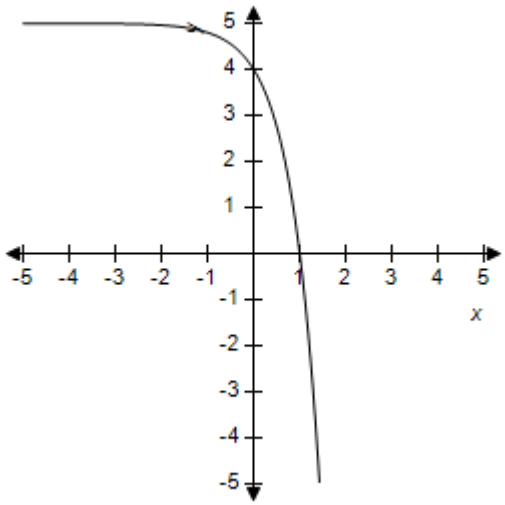

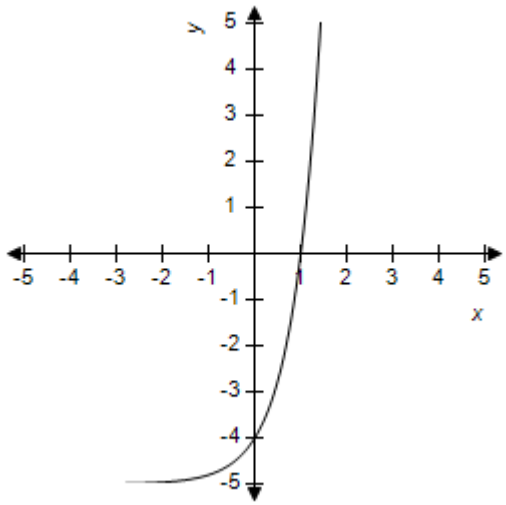

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.03.01.07 - Sketch graphs of transformations of exponential functions.
DATE CREATED: 3/22/2016 10:27 AM
DATE MODIFIED: 2/10/2020 4:48 AM

15. Starting with the graph of $y = e^x$, write the equation of the graph that results from shifting 7 units to the left and 6 units upward.

a. $y = e^{x+7} + 6$

b. $y = e^{x+6} + 7$

c. $y = e^{x+7} - 6$

d. $y = e^{x-7} + 6$

e. $y = 6e^{x-7}$

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.03.01.06 - Given its graph, write an equation for an exponential function.
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16. Find the domain of the function.

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1.4 Exponential Functions

$$f(x) = \frac{3}{1 - e^x}$$

ANSWER:	$(-\infty, 0) \cup (0, \infty)$
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	SCalcET7 1.1.42 SCalc7e 1.1.42
QUESTION TYPE:	Numeric Response
HAS VARIABLES:	True
LEARNING OBJECTIVES:	PCALC.COH.LO.03.01.04 - Find the domain and range of exponential functions.
OTHER:	Numerical Response
NOTES:	SCalcET7 Section 1.1 SCalc7e Section 1.1
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1.5 Inverse Functions and Logarithms

1. Suppose that the graph of $y = \log_2 x$ is drawn on a coordinate grid where the unit of measurement is an inch. How many miles to the right of the origin do we have to move before the height of the curve reaches 3 ft? Rounded to the nearest mile.

a. 5.2 mi
b. 1,084,587.7 mi
c. 103 mi
d. 13,015,052.4 mi
e. –97 mi

ANSWER:	b
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	1.6.45
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.03.04.07 - Solve logarithmic equations using the laws of logarithms.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	Section 1.6
DATE CREATED:	7/20/2015 1:46 PM
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2. If a bacteria population starts with 100 bacteria and doubles every three hours, then the number of bacteria after *t* hours is

$$n = f(t) = 100\left(2^{\frac{t}{3}}\right).$$

When will the population reach 45,000? Round the answer to the nearest tenth.

a. 26.4 hours
b. 16.4 hours
c. 31.4 hours
d. 21.4 hours
e. 36.4 hours

ANSWER:	a
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	1.6.61b
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.03.01.10 - Solve applied problems involving exponential

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	functions.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	Section 1.6
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3. Find the inverse function of $f(x) = \dfrac{x + 1}{5x + 1}$.

a. $f^{-1}(x) = -(x + 1)(5x + 1)$

b. $f^{-1}(x) = -\dfrac{5x + 1}{x - 1}$

c. $f^{-1}(x) = -\dfrac{x - 1}{5x - 1}$

d. $f^{-1}(x) = \dfrac{x}{5x - 1}$

e. $f^{-1}(x) = (x + 1)(5x + 1)$

ANSWER:	c
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	1.6.22
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.05.10 - Find the inverse of a function algebraically.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	Section 1.6
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DATE MODIFIED:	1/30/2020 5:02 AM

4. Determine whether the function is one-to-one.

$f(x) = \sqrt{4 - x}$

a. No

b. Yes

ANSWER:	b
POINTS:	1
DIFFICULTY:	Easy
REFERENCES:	1.6.9
QUESTION TYPE:	Multi-Mode (Multiple choice)

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1.5 Inverse Functions and Logarithms

HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.05.03 - Given its equation, determine if a function is one-to-one.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	Section 1.6
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5. Find $f^{-1}(a)$ for the function f and the real number a.

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

a. 0
b. –1
c. –2
d. 1

ANSWER:	b
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	1.6.16
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.05.09 - Evaluate the inverse of a one-to-one function given its numerical, algebraic, or graphical representation.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	Section 1.6
DATE CREATED:	7/20/2015 1:46 PM
DATE MODIFIED:	1/30/2020 5:22 AM

6. Find the inverse of f. Then sketch the graphs of f and f^{-1} on the same set of axes.

$f(x) = \sqrt{16 - x^2}, x \geq 0$

a. $f^{-1}(x) = -\sqrt{16 - x^2}, x \geq 0$

$f = f^{-1}$

b. $f^{-1}(x) = \sqrt{4 + x^2}, x \geq 0$

$f(blue), f^{-1}(red)$

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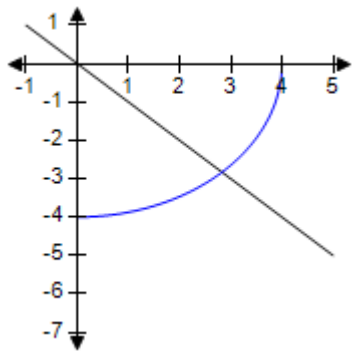
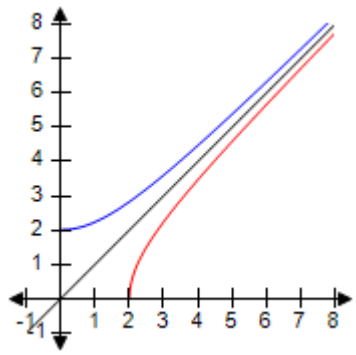
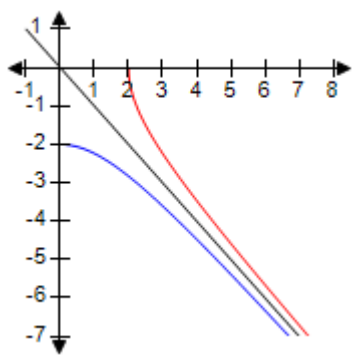




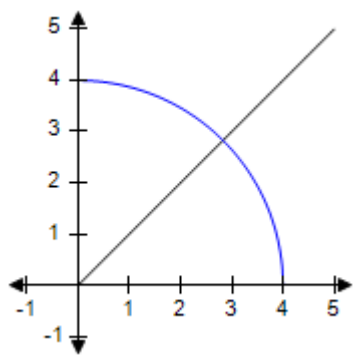
c. $f^{-1}(x) = -\sqrt{4+x^2}, x \geq 0$

$f(blue), f^{-1}(red)$



d. $f^{-1}(x) = \sqrt{16-x^2}, x \geq 0$

$f = f^{-1}$



ANSWER:	d
POINTS:	1
DIFFICULTY:	Easy
REFERENCES:	1.6.31
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.05.10 - Find the inverse of a function algebraically.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	Section 1.6
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7. Find the exact value of the given expression.

$\tan^{-1} 1$

a. 2^{π}
b. $\frac{\pi}{4}$

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c. $\frac{4}{\pi}$

d. 4^{π}

ANSWER:	b
POINTS:	1
DIFFICULTY:	Easy
REFERENCES:	1.6.63a
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.05.07.07 - Evaluate inverse trigonometric functions for given values in the domain.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	Section 1.6
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8. Find the exact value of the given expression.

$$\cos\left(\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right)$$

a. 1

b. $-\frac{1}{2}$

c. 0

d. $-\frac{\sqrt{3}}{2}$

ANSWER:	d
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	1.6.67b
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.05.07.08 - Find exact values of expressions involving compositions with inverse trigonometric functions.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	Section 1.6
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9. Use the laws of logarithms to expand the expression.

$$\ln\left(\frac{x+1}{x-2}\right)^{\frac{1}{2}}$$

a. $\frac{1}{2}\ln[(x+1)(x-2)]$

b. $\frac{1}{2}\ln(x+1) - \frac{1}{2}\ln(x-2)$

c. $\frac{1}{2}\ln\left(x - \frac{1}{2}\right)$

d. $\frac{1}{2}\ln\left(\frac{x+1}{x-2}\right)$

ANSWER:	b
POINTS:	1
DIFFICULTY:	Easy
REFERENCES:	1.6.39
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.03.03.06 - Expand logarithmic expressions using the laws of logarithms.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	Section 1.6
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10. Use the laws of logarithms to write the expression as the logarithm of a single quantity.

$$4\ln 5 - \frac{3}{4}\ln(x+3)$$

a. $\ln\frac{625}{(x+3)^{3/4}}$

b. $\frac{4\ln 5}{\frac{3}{4}\ln(x+3)}$

c. $\ln 5^4 - \ln(x+3)^{3/4}$

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d. $\dfrac{3\ln 625}{4(x+3)}$

ANSWER:	a
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	1.6.40
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.03.03.07 - Combine logarithmic expressions using the laws of logarithms.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	Section 1.6
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11. Simplify the expression.

$e^{3\ln 4}$

a. 7
b. 12
c. 64
d. 81

ANSWER:	c
POINTS:	1
DIFFICULTY:	Easy
REFERENCES:	1.6.38a
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.03.03.05 - Rewrite the logarithm of a power using the laws of logarithms.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	Section 1.6
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12. Solve the equation.

$3e^{x+2} = 2$

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1.5 Inverse Functions and Logarithms

a. $x = \ln\frac{2}{3} - 2$

b. $x = \ln\frac{2}{3} + 2$

c. $x = \ln\frac{3}{2} - 2$

d. $x = \ln\frac{3}{2} + 2$

ANSWER:	a
POINTS:	1
DIFFICULTY:	Easy
REFERENCES:	1.6.51a
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.03.04.04 - Solve exponential equations using logarithms.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	Section 1.6
DATE CREATED:	7/20/2015 1:46 PM
DATE MODIFIED:	2/5/2020 5:51 AM

13. Find a formula for the inverse of the function.

$y = \ln(x + 8)$

a. $y = e^x - 8$

b. $y = e^x + 8$

c. $y = -8e^x$

d. $y = 8e^x$

e. $y = e^{x+8}$

ANSWER:	a
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	1.6.25
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.05.10 - Find the inverse of a function algebraically.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	Section 1.6

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1.5 Inverse Functions and Logarithms

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14. Find the exact value of the expression.

$\log_5 100 + \log_5 50 - 3\log_5 2$

a. 7
b. 8
c. 6
d. 4
e. 5

ANSWER: d
POINTS: 1
DIFFICULTY: Medium
REFERENCES: 1.6.37a
QUESTION TYPE: Multi-Mode (Multiple choice)
HAS VARIABLES: True
STUDENT ENTRY MODE: Basic
LEARNING OBJECTIVES: PCALC.COH.LO.03.03.02 - Evaluate logarithms using the laws of logarithms.
KEYWORDS: 7ET
OTHER: Bimodal
NOTES: Section 1.6
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15. When a camera flash goes off, the batteries immediately begin to recharge the flash's capacitor, which stores electric charge given by

$$Q(t) = Q_0\left(1 - e^{-t/a}\right)$$

(The maximum charge capacity Q_0 is and t is measured in seconds.) How long does it take to recharge the capacitor to 90% of capacity if a = 4?

a. $-4\ln\left(\frac{9}{10}\right)$ seconds

b. $-4\ln\left(\frac{1}{10}\right)$ seconds

c. $-4\ln(10)$ seconds

d. $-4\ln(1)$ seconds

e. $-\ln\left(\frac{4}{9}\right)$ seconds

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1.5 Inverse Functions and Logarithms

ANSWER:	b
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	1.6.62b
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.03.01.10 - Solve applied problems involving exponential functions.
KEYWORDS:	7ET
OTHER:	Bimodal
NOTES:	Section 1.6
DATE CREATED:	7/20/2015 1:46 PM
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16. If $f(x) = 3x + \ln x$, find $f^{-1}(3)$. Round to the nearest whole.

ANSWER: $f^{-1}(3) = 1$

POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	1.6.17
QUESTION TYPE:	Numeric Response
HAS VARIABLES:	True
LEARNING OBJECTIVES:	PCALC.COH.LO.01.05.09 - Evaluate the inverse of a one-to-one function given its numerical, algebraic, or graphical representation.
KEYWORDS:	7ET
OTHER:	Numerical Response
NOTES:	Section 1.6
DATE CREATED:	7/20/2015 1:46 PM
DATE MODIFIED:	1/30/2020 6:58 AM

17. Solve each equation for x.

(a) $\ln x = 3$ (b) $e^{e^x} = 6$

ANSWER: $x = e^3, x = \ln(\ln 6)$

POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	1.6.51

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1.5 Inverse Functions and Logarithms

QUESTION TYPE: Numeric Response
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.UO.03.04.04 - Solve exponential and logarithmic equations algebraically and graphically.
KEYWORDS: 7ET
OTHER: Numerical Response
NOTES: Section 1.6
DATE CREATED: 7/20/2015 1:46 PM
DATE MODIFIED: 1/30/2020 7:00 AM

18. Simplify the expression.

$\sin\left(2\cos^{-1}4x\right)$

ANSWER: $8x\sqrt{1-16x^2}$

POINTS: 1
DIFFICULTY: Medium
REFERENCES: 1.6.72
QUESTION TYPE: Numeric Response
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.05.07.08 - Find exact values of expressions involving compositions with inverse trigonometric functions.
KEYWORDS: 7ET
OTHER: Numerical Response
NOTES: Section 1.6
DATE CREATED: 7/20/2015 1:46 PM
DATE MODIFIED: 1/30/2020 7:03 AM

19. Find the exact value of the expression.

$\cos\left(\arcsin\frac{1}{2}\right)$

ANSWER: $\frac{\sqrt{3}}{2}$

POINTS: 1
DIFFICULTY: Medium
REFERENCES: 1.6.67

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1.5 Inverse Functions and Logarithms

QUESTION TYPE: Numeric Response
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.05.07.08 - Find exact values of expressions involving compositions with inverse trigonometric functions.
KEYWORDS: 7ET
OTHER: Numerical Response
NOTES: Section 1.6
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20. Fill in the blanks.

Let $f(x) = 3 + x^2 + \tan\left(\frac{\pi x}{2}\right)$, where $-1 < x < 1$.

$f^{-1}(f(3))$ _____ $f(f^{-1}(5))$ _____

ANSWER: 3, 5
POINTS: 1
DIFFICULTY: Medium
REFERENCES: 1.6.66a
QUESTION TYPE: Numeric Response
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.01.05.09 - Evaluate the inverse of a one-to-one function given its numerical, algebraic, or graphical representation.
KEYWORDS: 7ET
OTHER: Numerical Response
NOTES: Section 1.6
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21. Find the domain, range, and x-intercept(s) of the function.

$f(x) = \ln(x - 4) - 1$

ANSWER: Domain: $(4, \infty)$ Range: $(-\infty, \infty)$ x-intercept: $x = e + 4$

POINTS: 1
DIFFICULTY: Medium
REFERENCES: 1.6.50
QUESTION TYPE: Numeric Response

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1.5 Inverse Functions and Logarithms

HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.03.02.05 - Find the domain and range of logarithmic functions.
KEYWORDS: 7ET
OTHER: Numerical Response
NOTES: Section 1.6
DATE CREATED: 7/20/2015 1:46 PM
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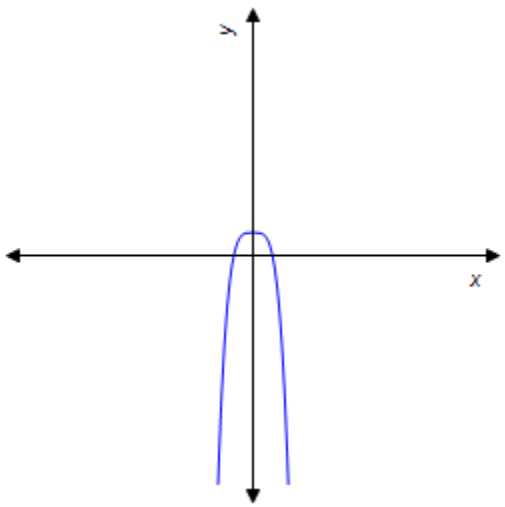
22. Determine whether f is one-to-one.



ANSWER: No
POINTS: 1
DIFFICULTY: Easy
REFERENCES: 1.6.5
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: True
STUDENT ENTRY MODE: Basic
LEARNING OBJECTIVES: PCALC.COH.LO.01.05.02 - Given its graph, determine if a function is one-to-one using the horizontal line test.
KEYWORDS: 7ET
OTHER: Short Answer
NOTES: Section 1.6
DATE CREATED: 7/20/2015 1:46 PM
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23. The graph of f is given. Sketch the graph of f^{-1} on the same set of axes.
$y = f(x)$

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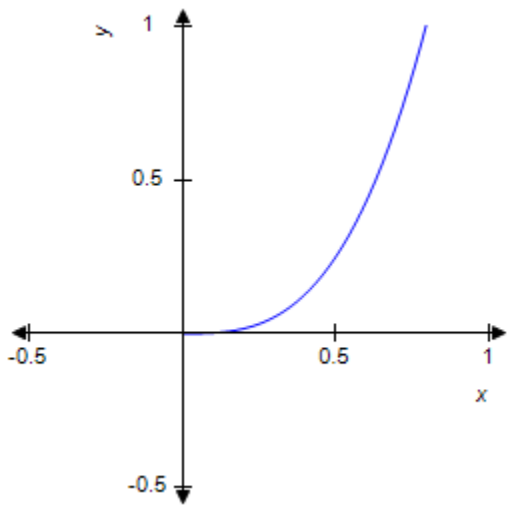
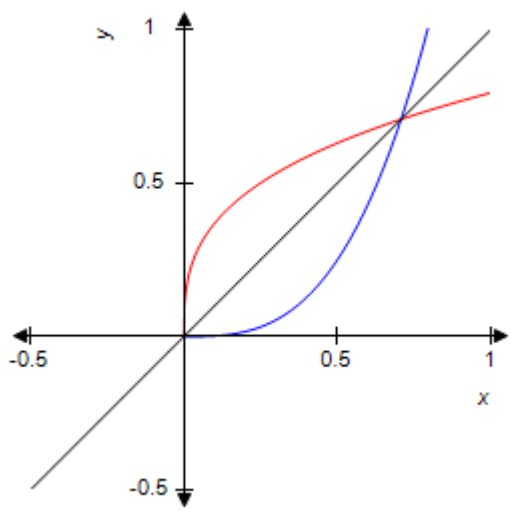
1.5 Inverse Functions and Logarithms



ANSWER: $y = f(x)$ - blue, $y = f^{-1}(x)$ -red



POINTS:	1
DIFFICULTY:	Easy
REFERENCES:	1.6.30
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.05.06 - Given the graph of a one-to-one function, sketch the graph of its inverse using symmetry.
KEYWORDS:	7ET
OTHER:	Short Answer
NOTES:	Section 1.6
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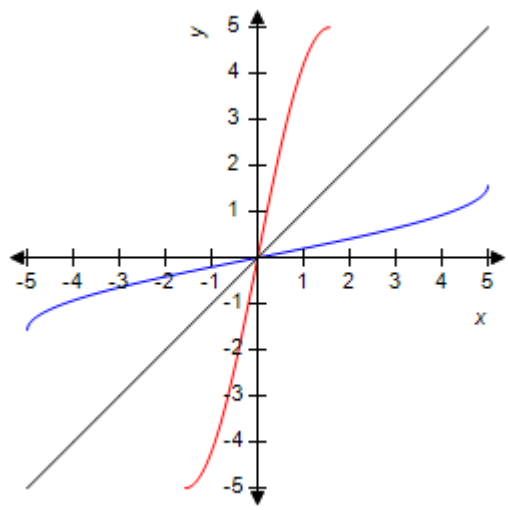
24. Find the inverse of *f*. Then sketch the graphs of *f* and f^{-1} on the same set of axes.

$$f(x) = \sin^{-1}\left(\frac{x}{5}\right), -5 \le x \le 5$$

ANSWER: $f^{-1}(x) = 5\sin x, -\frac{\pi}{2} \le x \le \frac{\pi}{2}$



POINTS:	1
DIFFICULTY:	Easy
REFERENCES:	1.6.32
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.01.05.10 - Find the inverse of a function algebraically.
KEYWORDS:	7ET
OTHER:	Short Answer
NOTES:	Section 1.6
DATE CREATED:	7/20/2015 1:46 PM
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25. Find the inverse of *f*. Then use a graphing utility to plot the graphs of *f* and f^{-1} on the same set of axes.

$$f(x) = \frac{1 - e^{6x}}{1 + e^{6x}}$$

ANSWER: $f^{-1}(x) = \frac{1}{6}\ln\left(\frac{1 - x}{1 + x}\right)$

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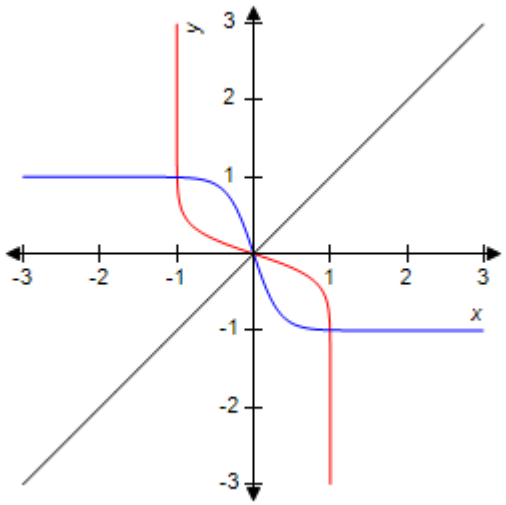
1.5 Inverse Functions and Logarithms



POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	1.6.26
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.03.02.09 - Graph logarithmic functions involving common and natural logarithms using a graphing tool.
KEYWORDS:	7ET
OTHER:	Short Answer
NOTES:	Section 1.6
DATE CREATED:	7/20/2015 1:46 PM
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26. Sketch the graph of f.

$f(x) = \ln(x+5) - 3$

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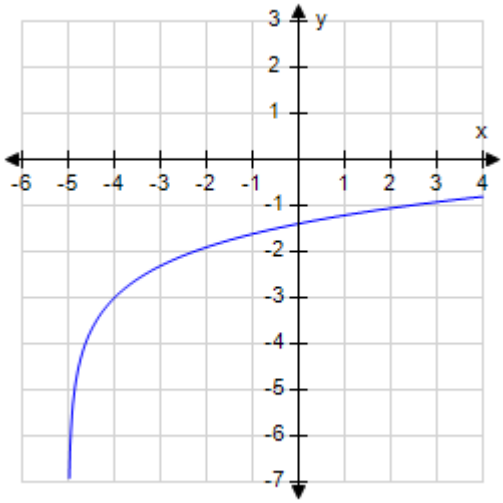
ANSWER:



POINTS:	1
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.03.02.07 - Sketch graphs of transformation of logarithmic functions.
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1.6 Parametric Curves

1. Find parametric equations to represent the line segment from $(-2,3)$ to $(12,-8)$.

a. $x = -2 - 14t,\ y = 3 - 11t,\ 0 \le t \le 1$
b. $x = -2 - 14t,\ y = 3 - 11t,\ 0 \le t \le 2$
c. $x = 8 - 14t,\ y = 3 - 11t,\ 0 \le t \le 2$
d. $x = -2 + 14t,\ y = 3 - 11t,\ 0 \le t \le 1$
e. $x = 2 + 14t,\ y = 3 - 11t,\ 0 \le t \le 1$

ANSWER:	d
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	10.1.31b
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.07.04.03 - Write the parametric equations given the description of a curve.
OTHER:	Bimodal
NOTES:	Section 10.1
DATE CREATED:	7/20/2015 2:23 PM
DATE MODIFIED:	2/7/2020 7:35 AM

2. If a projectile is fired with an initial velocity of v_0 meters per second at an angle α above the horizontal and air resistance is assumed to be negligible, then its position after t seconds is given by the parametric equations

$$x = (v_0 \cos\alpha)t,\ y = (v_0 \sin\alpha)t - \frac{1}{2}gt^2,$$

where g is the acceleration of gravity $(9.8\ \mathrm{m/s^2})$. If a gun is fired with α = 55° and v_0 = 440 m/s when will the bullet hit the ground?

a. $t = 244$ s
b. $t = 74$ s
c. $t = 344$ s
d. $t = 124$ s
e. $t = 224$ s

ANSWER:	b
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	10.1.46
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.UO.07.04.04 - Graph plane curves defined by parametric equations.

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1.6 Parametric Curves

OTHER:	Bimodal
NOTES:	Section 10.1
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DATE MODIFIED:	2/7/2020 7:41 AM

3. Describe the motion of a particle with position (x, y) as t varies in the given interval $0 \le t \le 2\pi$.

$x = 8\sin t,\ y = 6\cos t$

a. Moves once counterclockwise along the circle $x^2 + y^2 = 1$ starting and ending at (0, –6).

b. Moves once counterclockwise along the ellipse $\frac{x^2}{64} + \frac{y^2}{36} = 1$ starting and ending at (0, 6).

c. Moves once counterclockwise along the ellipse $\frac{x^2}{6} + \frac{y^2}{8} = 1$ starting and ending at (–6, 0).

d. Moves once clockwise along the ellipse $\frac{x^2}{64} + \frac{y^2}{36} = 1$ starting and ending at (0, 6).

e. Moves once clockwise along the circle $(8x)^2 + (6y)^2 = 1$ starting and ending at (0, 6).

ANSWER:	d
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	10.1.21
QUESTION TYPE:	Multi-Mode (Multiple choice)
HAS VARIABLES:	True
STUDENT ENTRY MODE:	Basic
LEARNING OBJECTIVES:	PCALC.COH.LO.07.04.01 - Sketch the graph of a plane curve defined by a parametric equation.
OTHER:	Bimodal
NOTES:	Section 10.1
DATE CREATED:	7/20/2015 2:23 PM
DATE MODIFIED:	1/13/2021 2:58 AM

4. If a and b are fixed numbers, find parametric equations for the set of all points P determined as shown in the figure, using the angle *ang* as the parameter. Write the equations for $a = 10$ and $b = 8$.

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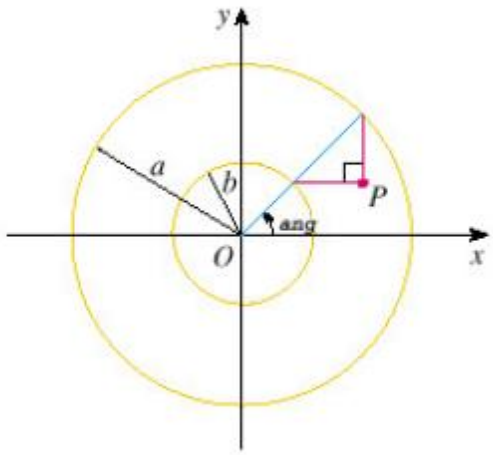
1.6 Parametric Curves



ANSWER: $x = 10\cos(ang),\ y = 8\sin(ang),\ 0 \le ang \le 2\pi$

POINTS: 1
DIFFICULTY: Medium
REFERENCES: 10.1.41
QUESTION TYPE: Numeric Response
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.07.04.06 - Given the graph of a parametric curve, identify its equation.
OTHER: Numerical Response
NOTES: Section 10.1
DATE CREATED: 7/20/2015 2:23 PM
DATE MODIFIED: 1/13/2021 3:28 AM

5. Find parametric equations for the path of a particle that moves once clockwise along the circle $x^2 + (y-7)^2 = 16$, starting at (4, 7).

ANSWER: $x = 4\cos t,\ y = 7 - 4\sin t,\ 0 \le t \le 2\pi$

POINTS: 1
DIFFICULTY: Medium
REFERENCES: 10.1.33a
QUESTION TYPE: Numeric Response
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.07.04.03 - Write the parametric equations given the description of a curve.
OTHER: Numerical Response
NOTES: Section 10.1
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6. Eliminate the parameter to find a Cartesian equation of the curve.
$x = e^{6t} - 4,\ y = e^{12t}$

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1.6 Parametric Curves

ANSWER: $y = (x+4)^2$

POINTS: 1
DIFFICULTY: Medium
REFERENCES: 10.1.14
QUESTION TYPE: Numeric Response
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.07.04.02 - Write the equation of a plane curve in rectangular form by eliminating the parameter.
OTHER: Numerical Response
NOTES: Section 10.1
DATE CREATED: 7/20/2015 2:23 PM
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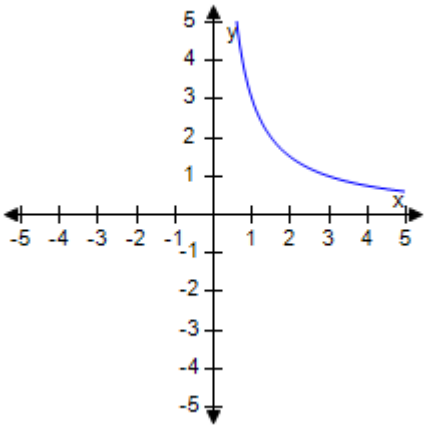
7. Sketch the parametric curve and eliminate the parameter to find the Cartesian equation of the curve.

$x = \cos\theta,\ y = 3\sec\theta,\ 0 \le \theta \le \frac{\pi}{2}$

ANSWER: $y = \frac{3}{x}$



POINTS: 1
DIFFICULTY: Medium
REFERENCES: 10.1.13b
QUESTION TYPE: Numeric Response
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.07.04.01 - Sketch the graph of a plane curve defined by a

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	parametric equation.
OTHER:	Numerical Response
NOTES:	Section 10.1
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8. Eliminate the parameter to find a Cartesian equation of the curve.

$x(t) = 6\cos^2 t,\ y(t) = 7\sin^2 t$

ANSWER:	$x = 6 - \frac{6}{7}y$
POINTS:	1
DIFFICULTY:	Medium
REFERENCES:	10.1.17a
QUESTION TYPE:	Numeric Response
HAS VARIABLES:	True
LEARNING OBJECTIVES:	PCALC.COH.LO.07.04.02 - Write the equation of a plane curve in rectangular form by eliminating the parameter.
OTHER:	Numerical Response
NOTES:	Section 10.1
DATE CREATED:	7/20/2015 2:23 PM
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9. Find the point(s) of intersection of the following two parametric curves, by first eliminating the parameter, then solving the system of equations.

$x = t,\ y = t^3$ and $x = t^3,\ y = t^6$

a. $(0, 0)$

b. $(1, 1)$

c. $(1, -1)$

d. (0, 0) and (1, 1)

e. (0, 0), (1, -1), and (1, 1)

ANSWER:	d
POINTS:	1
QUESTION TYPE:	Multiple Choice
HAS VARIABLES:	True
LEARNING OBJECTIVES:	PCALC.COH.LO.07.04.02 - Write the equation of a plane curve in rectangular form by eliminating the parameter.
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1.6 Parametric Curves

10. Find the point(s) of intersection of the following two parametric curves, by first eliminating the parameter, then solving the system of equations.

$x = t + 15, y = t^2$ and $x = \frac{1}{20}t, y = t$

a. $(45, 900)$

b. $(5, 100)$

c. $(900, 100)$

d. (45, 900) and (5, 100)

e. (45, 900) and (900, 100)

ANSWER:	d
POINTS:	1
QUESTION TYPE:	Multiple Choice
HAS VARIABLES:	True
LEARNING OBJECTIVES:	PCALC.COH.LO.07.04.02 - Write the equation of a plane curve in rectangular form by eliminating the parameter.
DATE CREATED:	3/26/2016 8:51 AM
DATE MODIFIED:	6/23/2020 12:05 PM

11. Eliminate the parameter to find a Cartesian equation of the curve.

$x = \cot\theta, y = \csc^2\theta, 0 < \theta < \pi$

a. $y = x^2 + 1$

b. $y = 1 - x^2$

c. $y = x^2 - 1$

d. $y = \sqrt{x} - 1$

e. $y = 1 - \sqrt{x}$

ANSWER:	a
POINTS:	1
QUESTION TYPE:	Multiple Choice
HAS VARIABLES:	False
LEARNING OBJECTIVES:	PCALC.COH.LO.07.04.02 - Write the equation of a plane curve in rectangular form by eliminating the parameter.
DATE CREATED:	3/28/2016 4:55 AM
DATE MODIFIED:	2/10/2020 2:54 AM

12. Find the parametric equations for the path of a particle that moves two and a half times clockwise around the circle $(x-6)^2 + y^2 = 16$, starting at $(6, 4)$.

a. $x = 6 + 4\sin t, y = 4\cos t, 0 \le t \le 5\pi$

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b. $x = 4\sin t,\ y = 4\cos t + 6,\ 0 \le t \le 5\pi$

c. $x = 4\cos t + 6,\ y = 4\sin t,\ 0 \le t \le 5\pi$

d. $x = 6 - 4\sin t,\ y = 4\cos t,\ 0 \le t \le 5\pi$

e. $x = 16\sin t,\ y = 16\cos t + 6,\ 0 \le t \le 2\pi$

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.07.04.03 - Write the parametric equations given the description of a curve.
DATE CREATED: 3/28/2016 5:03 AM
DATE MODIFIED: 2/10/2020 3:01 AM

13. Find parametric equations for the ellipse $\frac{x^2}{9} + \frac{y^2}{16} = 1$.

a. $x = 3\sin t,\ y = 4\cos t$

b. $x = 4\sin t,\ y = 3\cos t$

c. $x = 9\sin t,\ y = 16\cos t$

d. $x = 16\sin t,\ y = 9\cos t$

e. $x = 9\sin t,\ y = 16\sin t$

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.07.04.03 - Write the parametric equations given the description of a curve.
DATE CREATED: 3/28/2016 5:12 AM
DATE MODIFIED: 2/10/2020 3:07 AM

14. Let P be a point at a distance 6 units from the center of a circle of radius 2. The curve traced out by P as the circle rolls along a straight line is called a trochoid. (Think of the motion of a point on a spoke of a bicycle wheel.) Assuming the line is the x-axis and $\theta = 0$ when P is at one of its lowest points, find the parametric equations of the trochoid. (Hint: use the same parameter θ as for the cycloid.)

a. $x = 2\theta - 6\sin\theta,\ y = 2 - 6\cos\theta$

b. $x = 2\theta - 6\sin\theta,\ y = 6 - 2\cos\theta$

c. $x = 6\theta - 2\sin\theta,\ y = 2 - 6\cos\theta$

d. $x = 6\theta - 2\sin\theta,\ y = 6 - 2\cos\theta$

e. $x = 2\theta - 6\cos\theta,\ y = 2 - 6\sin\theta$

ANSWER: a
POINTS: 1

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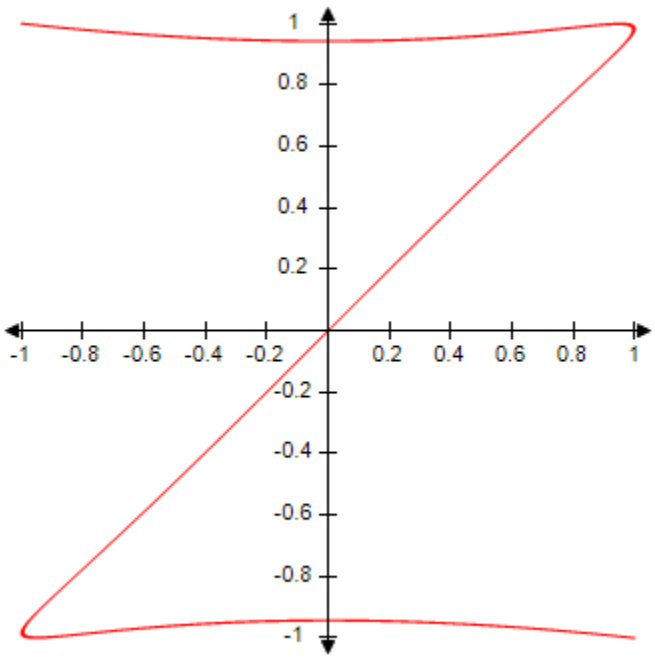
1.6 Parametric Curves

QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.07.04.03 - Write the parametric equations given the description of a curve.
DATE CREATED: 3/28/2016 5:18 AM
DATE MODIFIED: 2/18/2020 4:34 AM

15. Determine which of the following parametric equations matches the graph.



a. $x = \sin 3t,\ y = \sin(t + \sin 2t)$

b. $x = t^3 + 1,\ y = -t^2$

c. $x = \sin 2t,\ y = \cos(t^2 - 3t)$

d. $x = \sinh t,\ y = \cosh t$

e. $x = \sin t,\ y = \sec t^2$

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.07.04.06 - Given the graph of a parametric curve, identify its equation.
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1.6 Parametric Curves

16. The curve is traced out by a point P on the circumference of a circle as the circle rolls along the line $y = 2$. Find the parametric equations for the curve if the circle has radius 6 and if one position of P is the point $(4,2)$.

a. $x = 6(\theta - \sin\theta) + 4$, $y = 6(1 - \cos\theta) + 2$
b. $x = 6(\theta - \sin\theta) - 4$, $y = 6(1 - \cos\theta) + 2$
c. $x = 6(1 - \cos\theta) + 4$, $y = 6(\theta - \sin\theta) + 2$
d. $x = 6(1 - \cos\theta) - 4$, $y = 6(\theta - \sin\theta) + 2$
e. $x = 6(1 - \sin\theta) + 4$, $y = 6(\theta - \cos\theta) + 2$
f. $x = 6(1 - \sin\theta) - 4$, $y = 6(\theta - \cos\theta) + 2$

ANSWER:	a
POINTS:	1
QUESTION TYPE:	Multiple Choice
HAS VARIABLES:	True
LEARNING OBJECTIVES:	PCALC.COH.LO.07.04.03 - Write the parametric equations given the description of a curve.
DATE CREATED:	1/27/2021 6:39 AM
DATE MODIFIED:	2/4/2021 10:05 AM

17. The cycloid is defined by the parametric equations $x = 12\theta - 12\sin\theta$ and $y = 12 - 12\cos\theta$. What is the maximum height of one arch of the cycloid?

a. 24
b. 12
c. 144
d. 6

ANSWER:	a
POINTS:	1
QUESTION TYPE:	Multiple Choice
HAS VARIABLES:	True
LEARNING OBJECTIVES:	PCALC.COH.UO.07.04.04 - Graph plane curves defined by parametric equations.
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18. Determine which of the following parametric equations match the graph.

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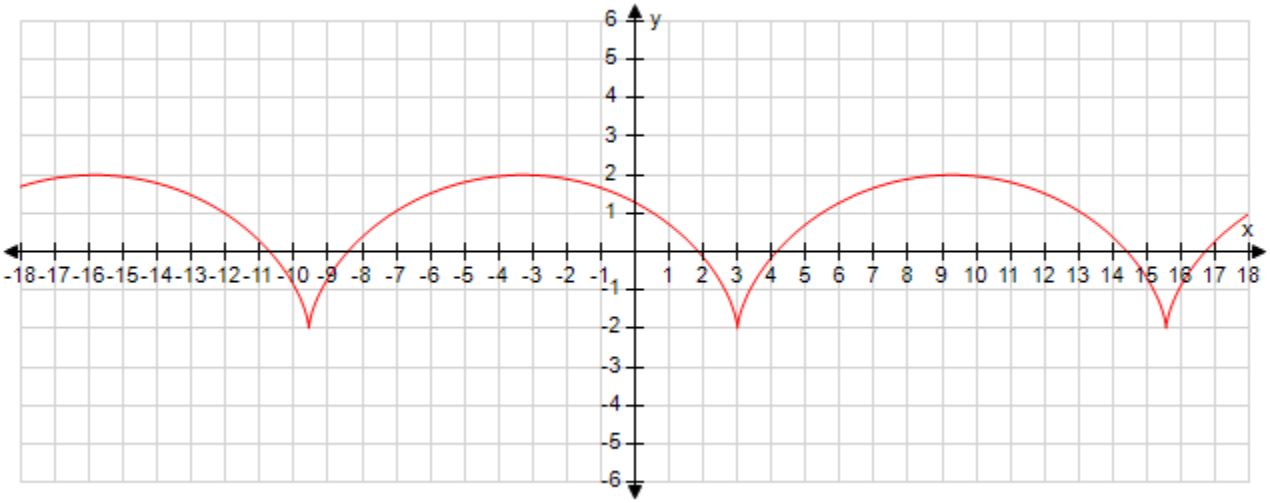
1.6 Parametric Curves



a. $x = 2(t - \sin t) + 3$, $y = 2(1 - \cos t) - 2$

b. $x = 2(t - \sin t) - 3$, $y = 2(1 - \cos t) - 2$

c. $x = 4(t - \sin t) + 3$, $y = 4(1 - \cos t) - 2$

d. $x = 4(t - \sin t) - 3$, $y = 4(1 - \cos t) - 2$

e. $x = 2(t - \sin t) - 3$, $y = 2(1 - \cos t) + 2$

f. $x = 4(t - \sin t) - 3$, $y = 4(1 - \cos t) + 2$

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: True
LEARNING OBJECTIVES: PCALC.COH.LO.07.04.06 - Given the graph of a parametric curve, identify its equation.
DATE CREATED: 1/27/2021 7:09 AM
DATE MODIFIED: 1/27/2021 2:34 PM

19. Investigate the family of curves defined by the parametric equations $x = t^3$, $y = 9t^2 - bt + 9$. Find all values of b such that the curve intersects the x-axis twice.

ANSWER: $(-\infty, 18) \cup (18, \infty)$
POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: True
STUDENT ENTRY MODE: Basic
LEARNING OBJECTIVES: PCALC.COH.UO.07.04.04 - Graph plane curves defined by parametric equations.
DATE CREATED: 1/27/2021 4:01 AM
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20. Consider the family of curves with parametric equations $x = k\sin 6t$, $y = \cos 12t$. Eliminate the parameter to

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find Cartesian equations of the curves. What is the shape of the curves?

ANSWER:

$$y = 1 - \frac{2x^2}{k^2}, \ |x| \le |k|$$

This is a family of parabolas with vertex at (0,1) opening downward. As $|k|$ increases, the parabolas get wider.

POINTS: 1

QUESTION TYPE: Subjective Short Answer

HAS VARIABLES: True

STUDENT ENTRY MODE: Basic

LEARNING OBJECTIVES: PCALC.COH.LO.07.04.02 - Write the equation of a plane curve in rectangular form by eliminating the parameter.

DATE CREATED: 1/27/2021 4:24 AM

DATE MODIFIED: 2/4/2021 11:06 AM

21. Graph several members of the family of curves with parametric equations $x = 4t^2$, $y = t^5 - ct$. How does the shape change as
c increases? For what values of c does the curve have a loop?

ANSWER:

All the curves pass through the origin.
For negative c, the curves are smooth and bend from the y-axis a bit. The smaller is c, the closer they are to the y-axis.
When $c = 0$, the curve has a cusp at the origin.
For positive c, the cusp turns into a loop, which becomes larger as c approaches infinity.

POINTS: 1

QUESTION TYPE: Subjective Short Answer

HAS VARIABLES: True

STUDENT ENTRY MODE: Basic

LEARNING OBJECTIVES: PCALC.COH.UO.07.04.04 - Graph plane curves defined by parametric equations.

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