Test Bank for College Mathematics for Business Economics Life Sciences and Social Sciences 14th Barnett

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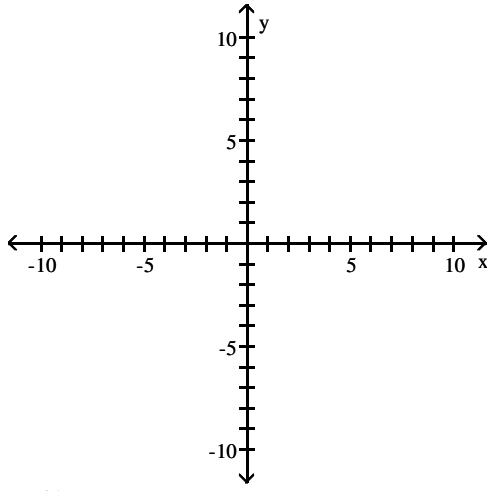
Exam

Name_____

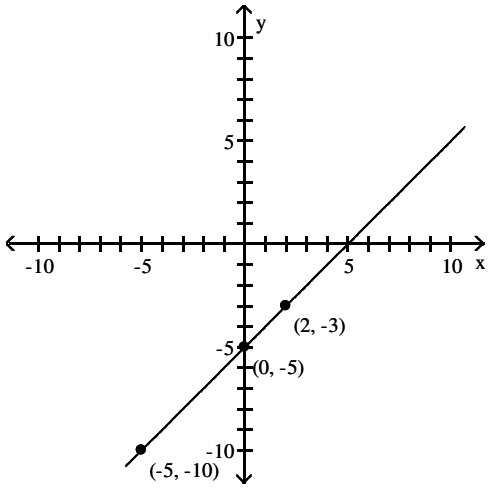
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Use point–by–point plotting to sketch the graph of the equation.

1) $y = x - 5$ 1) _____



A)



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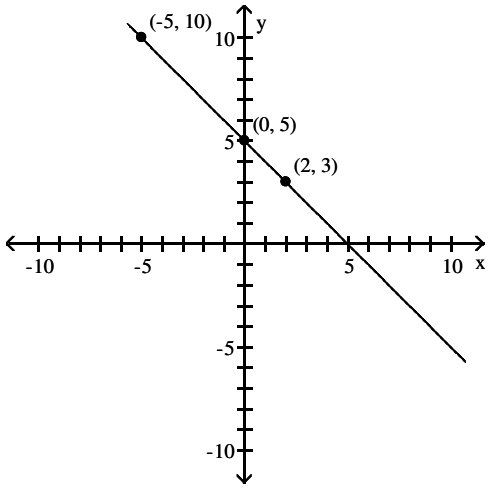

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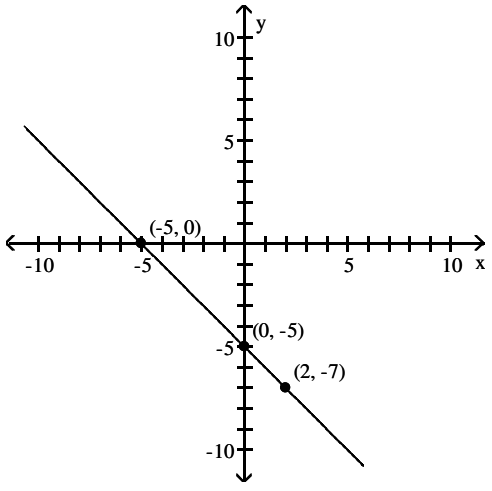
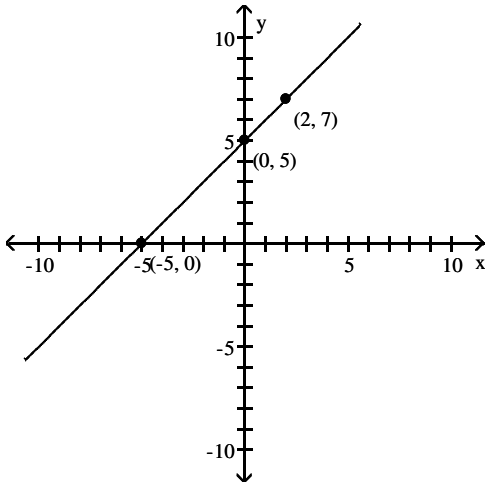


D)



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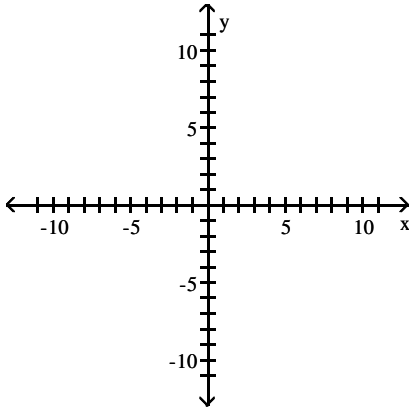
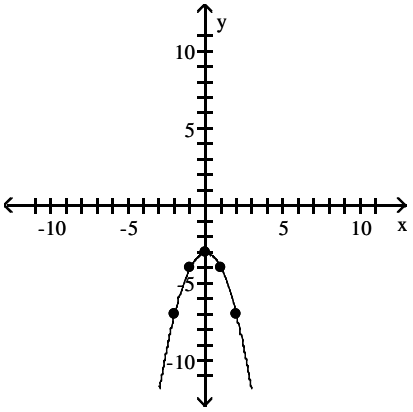
2) $y = x^2 - 3$ 2) _____



A)



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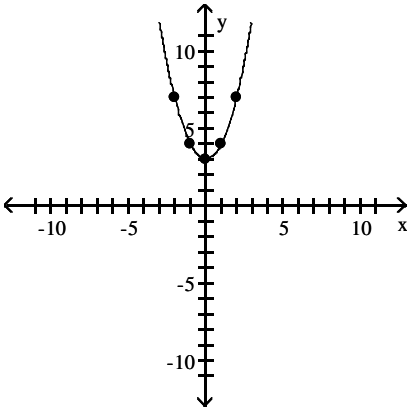

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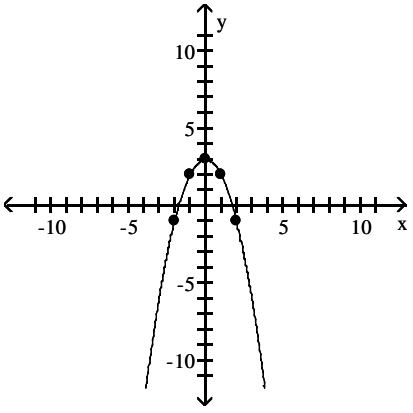

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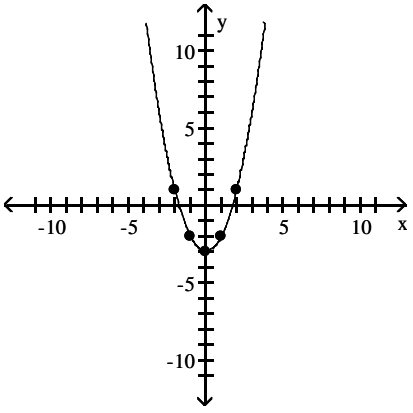

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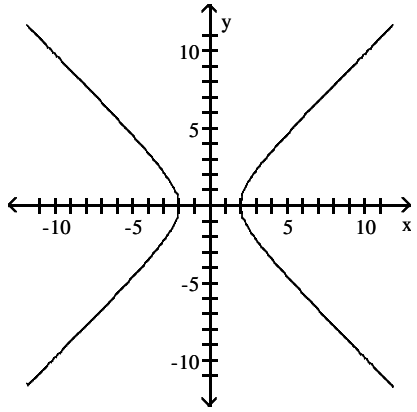
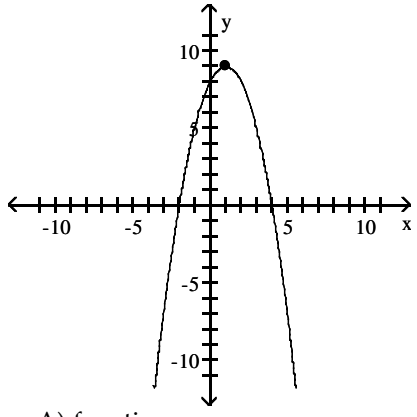
Determine whether the graph is the graph of a function.

3) 3) _____



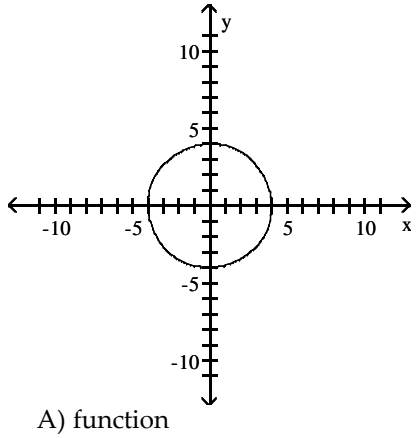
A) function B) not a function

4) 4) _____



A) function B) not a function

5) 5) _____



A) function B) not a function

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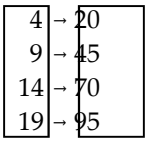
Determine whether the relation represents a function. If it is a function, state the domain and range.

6) 6) _____

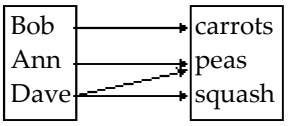


A) function
domain:{20, 45, 70, 95}
range: {4, 9, 14, 19}

B) function
domain: {4, 9, 14, 19}
range: {20, 45, 70, 95}

C) not a function

7) 7) _____



A) function
domain: {carrots, peas, squash}
range: {Bob, Ann, Dave}

B) function
domain: {Bob, Ann, Dave}
range: {carrots, peas, squash}

C) not a function

8) {(41, –3), (5, –2), (5, 0), (9, 2), (21, 4)} 8) _____

A) function
domain: {41, 9, 5, 21}
range: {–3, –2, 0, 2, 4}

B) function
domain: {–3, –2, 0, 2, 4}
range: {41, 9, 5, 21}

C) not a function

9) {(–3, 10), (–2, 5), (0, 1), (2, 5), (4, 17)} 9) _____

A) function
domain: {–3, –2, 0, 2, 4}
range: {10, 5, 1, 17}

B) function
domain: {10, 5, 1, 17}
range: {–3, –2, 0, 2, 4}

C) not a function

Determine whether the function is linear, constant, or neither

10) $y = \frac{x + 3}{7}$ 10) _____

A) Linear B) Constant C) Neither

11) $y = x^3 - x^2 + 8$ 11) _____

A) Linear B) Constant C) Neither

12) $y = \frac{2\pi}{3}$ 12) _____

A) Linear B) Constant C) Neither

13) $y - 12 = 0$ 13) _____

A) Linear B) Constant C) Neither

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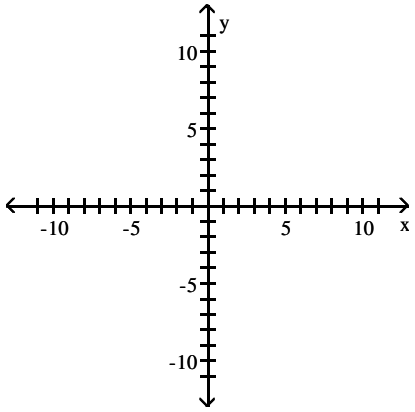
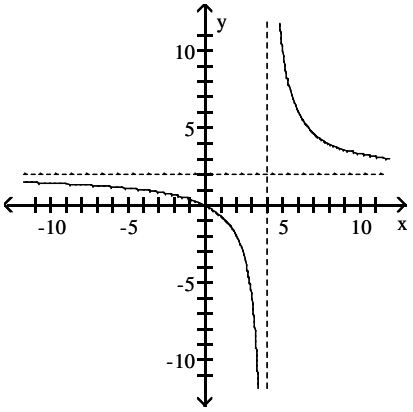
Use point–by–point plotting to sketch the graph of the equation.

14) $f(x) = \frac{2x}{x - 4}$ 14) _____



A)



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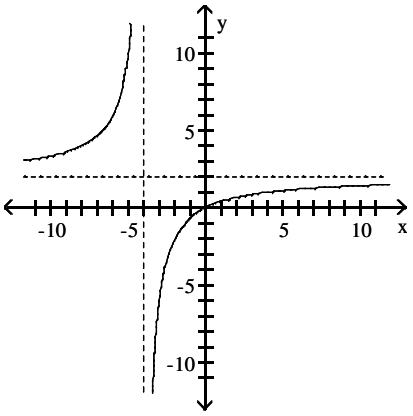

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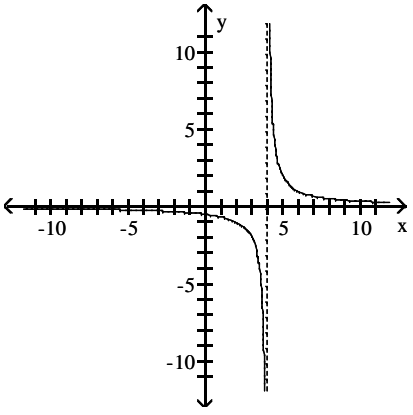

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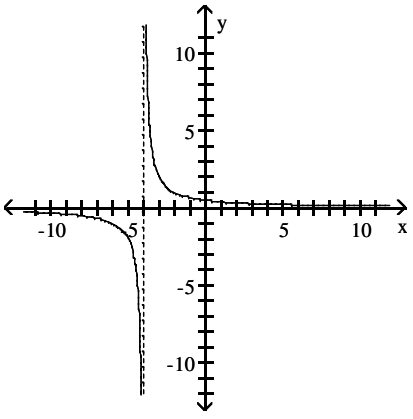

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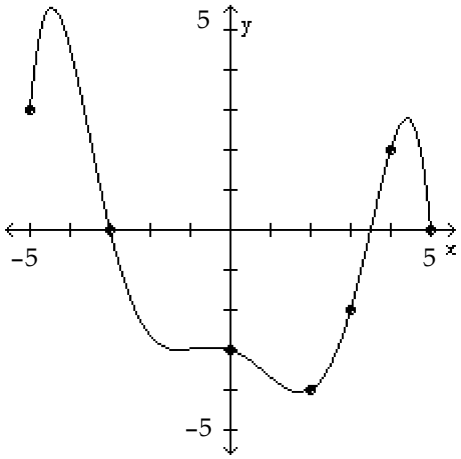
The graph of a function f is given. Use the graph to answer the question.

15) Use the graph of f given below to find f(–5). 15) _____



A) 8 B) –5 C) 3 D) 0

Find the function value.

16) Find f(–9) when $f(x) = 5 - 7x^2$. 16) _____

A) 131 B) 68 C) –562 D) 572

17) $f(x) = \frac{x^2 - 8}{x^3 + 7x}$; f(–2) 17) _____

A) 4 B) $-\frac{2}{11}$ C) $\frac{1}{2}$ D) $\frac{2}{11}$

18) Given that $f(x) = 5x^2 - 2x$, find f(t + 2). 18) _____

A) $5t^2 + 18t + 16$ B) 3t + 6 C) $t^2 + 2t - 6$ D) $5t^2 - 18t + 16$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

19) If $g(x) = -4x^2 + x - 9$, find g(–2), g(1), and $g\left(\frac{3}{2}\right)$. 19) _____

20) For f(t) = 3t + 2 and $g(t) = 2 - t^2$, find 4f(3) – g(–3) + g(0). 20) _____

21) For f(t) = 3 – 5t, find $\frac{f(a + h) - f(a)}{h}$. 21) _____

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MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Compute and simplify the difference quotient $\frac{f(x+h)-f(x)}{h}$, $h \neq 0$.

22) $f(x) = 5x^2 + 7x$ 22) _____

A) $15x - 7h + 14$ B) $10x + 5h + 7$ C) $10x^2 + 5h + 7x$ D) $10x + 7$

Determine the domain of the function.

23) $f(x) = -7x + 9$ 23) _____

A) $x \leq \frac{9}{7}$ B) All real numbers except $\frac{9}{7}$

C) No solution D) All real numbers

24) $f(x) = \frac{x}{x-2}$ 24) _____

A) All real numbers B) All real numbers except 2

C) $x < 2$ D) No solution

25) $f(x) = \sqrt{3-x}$ 25) _____

A) $x < 3$ B) All real numbers except 3

C) $x \leq 3$ D) No solution

26) $f(x) = \frac{8}{x^3}$ 26) _____

A) No solution B) All real numbers

C) $x < 0$ D) All real numbers except 0

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

27) Only one of the following functions has domain which is not equal to all real numbers. State which function and state its domain. 27) _____

(A) $h(x) = 4x^2 - 3x - 5$ (B) $f(x) = \frac{2x}{48-x}$ (C) $g(x) = \frac{x+7}{2}$

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Determine if the equation specifies a function with independent variable x. If so, find the domain. If not, find a value of x to which there corresponds more than one value of y.

28) $x - y^2 = 9$ 28) _____

A) A function with domain $\mathbb{R}$

B) Not a function; for example, when $x = 10$, $y = \pm 1$

29) $y = x^2 - 9$ 29) _____

A) A function with domain $\mathbb{R}$

B) Not a function; for example, when $x = -9$, then $y = \pm 1$

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30) $xy = -7$ 30) _____

A) A function with domain all real numbers except $x = 0$

B) Not a function; for example, when $x = -7$, $y = \pm 1$

31) $xy + 3y = 5$ 31) _____

A) A function with domain all real numbers except $x = -3$

B) Not a function; for example, when $x = 5$, $y = \pm 3$

32) $x^2 + y^2 = 49$ 32) _____

A) A function with domain $\mathbb{R}$

B) Not a function; for example, when $x = 0$, $y = \pm 7$

33) $x^2 - y^2 = 9$ 33) _____

A) A function with domain all real numbers except $x = 5$

B) Not a function; for example, when $x = 5$, $y = \pm 4$

Solve the problem.

34) The function F described by $F(x) = 2.75x + 71.48$ can be used to estimate the height, in centimeters, of a woman whose humerus (the bone from the elbow to the shoulder) is x cm long. Estimate the height of a woman whose humerus is 30.93 cm long. Round your answer to the nearest four decimal places. 34) _____

A) 156.5375 cm B) 43.3000 cm C) 105.1600 cm D) 13.5775 cm

35) The function M described by $M(x) = 2.89x + 70.64$ can be used to estimate the height, in centimeters, of a male whose humerus (the bone from the elbow to the shoulder) is x cm long. Estimate the height of a male whose humerus is 30.93 cm long. Round your answer to the nearest four decimal places. 35) _____

A) 160.0277 cm B) 156.5375 cm C) 30.9300 cm D) 157.3400 m

36) To estimate the ideal minimum weight of a woman in pounds multiply her height in inches by 4 and subtract 130. Let W = the ideal minimum weight and h = height. W is a linear function of h. Find the ideal minimum weight of a woman whose height is 62 inches. 36) _____

A) 120 lb B) 118 lb C) 378 lb D) 130 lb

37) The point at which a company's costs equals its revenue is the break–even. C represents cost, in dollars, of x units of a product. R represents the revenue, in dollars, for the sale of x units. Find the n of units that must be produced and sold in order to break even. 37) _____

$C = 15x + 12{,}000$

$R = 18x - 6000$

A) 6000 B) 12,000 C) 800 D) 545

38) The function P, given by $P(d) = \frac{1}{33}d + 1$, gives the pressure, in atmospheres (atm), at a depth d, in feet, under the sea. Find the pressure at 200 feet. Round your answer to the nearest whole number. 38) _____

A) 200 atm B) 7 atm C) 8 atm D) 201 atm

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39) To estimate the ideal minimum weight of a woman in pounds multiply her height in inches by 4 and subtract 130. Let W = the ideal minimum weight and h = height. Express W as a linear function of h. 39) _____

A) W(h) = 4h – 130
B) W(h) = 130h + 4
C) W(h) = 130
D) W(h) = 4 (h + 130)

Provide an appropriate response.

40) In a profit–loss analysis, point where revenue equals cost. 40) _____

A) inflection point
B) break–even point
C) turning point
D) profit–loss point

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

41) Let T be the set of teachers at a high school and let S be the set of students enrolled at that sc 41) _____
Determine which of the following correspondences define a function. Explain.
(A) A student corresponds to the teacher if the student is enrolled in the teacher's class.
(B) A student corresponds to every teacher of the school.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Give the domain and range of the function.

42) $f(x) = x^2 + 2$ 42) _____

A) Domain: [2, ∞); Range: all real numbers
B) Domain: [0, ∞); Range: [0, ∞)
C) Domain: all real numbers; Range: [2, ∞)
D) Domain: all real numbers; Range: [5, ∞)

43) $g(x) = x^2 - 4$ 43) _____

A) Domain: all real numbers; Range: [2, ∞)
B) Domain: [4, ∞); Range: all real numbers
C) Domain: [0, ∞); Range: [0, ∞)
D) Domain: all real numbers; Range: [–4, ∞)

44) $h(x) = -4|x|$ 44) _____

A) Domain: (–∞, 0]; Range: all real numbers
B) Domain: all real numbers; Range: (–∞, –3]
C) Domain: [0, ∞); Range: [0, ∞)
D) Domain: all real numbers; Range: (–∞, 0]

45) $s(x) = \sqrt{1 - x}$ 45) _____

A) Domain: (–∞, 1) ∪ (1, ∞); Range: (–∞, 0) ∪ (0, ∞)
B) Domain: (–∞, 1]; Range: [0, ∞)
C) Domain: ($\sqrt{1}$, ∞); Range: (–∞, 0]
D) Domain: all real numbers; Range: [0, ∞)

46) $r(x) = |x - 7| - 9$ 46) _____

A) Domain: all real numbers; Range: [– 9, ∞)
B) Domain: all real numbers; Range: [0, ∞)
C) Domain: [– 9, ∞); Range: all real numbers
D) Domain: all real numbers; Range: all real numbers

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Provide an appropriate response.

47) How can the graph of $f(x) = -\sqrt{x + 1}$ be obtained from the graph of $y = \sqrt{x}$? 47) _____

A) Shift it horizontally 1 units to the left. Reflect it across the x–axis.
B) Shift it horizontally –1 units to the left. Reflect it across the x–axis.
C) Shift it horizontally 1 units to the right. Reflect it across the x–axis.
D) Shift it horizontally 1 units to the left. Reflect it across the y–axis.

48) How can the graph of $f(x) = -(x - 1)^2$ 6 be obtained from the graph of $y = x^2$? 48) _____

A) Shift it horizontally 1 units to the right. Reflect it across the y–axis. Shift it 6 units up.
B) Shift it horizontally 1 units to the right. Reflect it across the y–axis. Shift it 6 units down.
C) Shift it horizontally 1 units to the left. Reflect it across the x–axis. Shift it 6 units up.
D) Shift it horizontally 1 units to the right. Reflect it across the x–axis. Shift it 6 units up.

Write an equation for a function that has a graph with the given transformations.

49) The shape of $y = \sqrt{x}$ is shifted 5 units to the left. Then the graph is shifted 7 units upward. 49) _____

A) $f(x) = \sqrt{x + 7} + 5$
B) $f(x) = 7\sqrt{x + 5}$
C) $f(x) = \sqrt{x + 5} + 7$
D) $f(x) = \sqrt{x - 5} + 7$

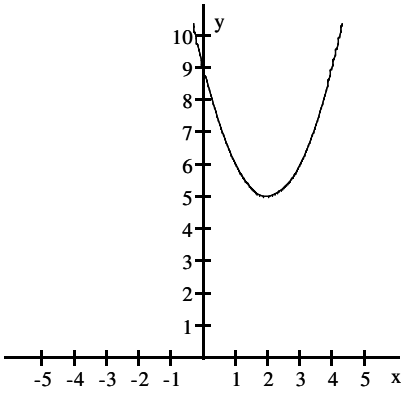
50) The shape of $y = x^2$ is vertically stretched by a factor of 10, and the resulting graph is reflected across the x–axis. 50) _____

A) $f(x) = 10(x - 10)^2$
B) $f(x) = (x - 10)^2$
C) $f(x) = 10x^2$
D) $f(x) = -10x^2$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

51) The following graph represents the result of applying a sequence of transformations to the g 51) _____
of a basic function. Identify the basic function and describe the transformation(s). Write the
equation for the given graph.



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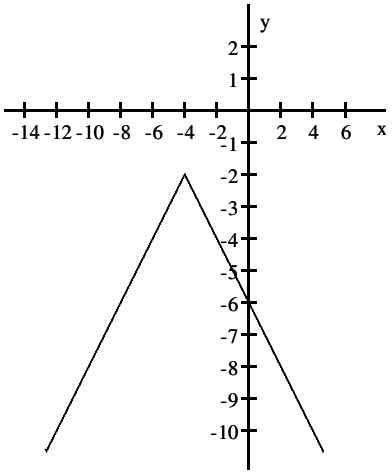
52) The following graph represents the result of applying a sequence of transformations to the g 52) _____
of a basic function. Identify the basic function and describe the transformation(s). Write the
equation for the given graph.

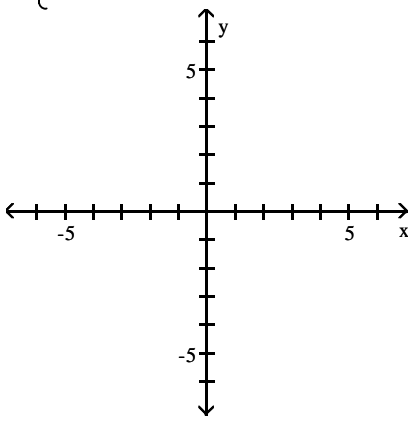


MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

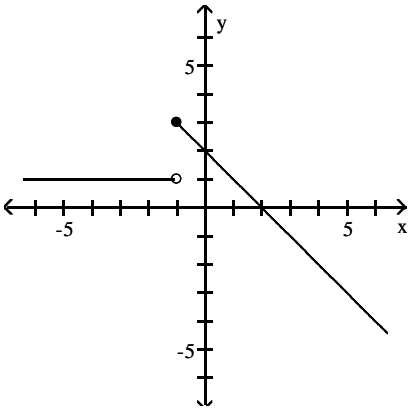
Graph the function.

53) 53) _____

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



A)



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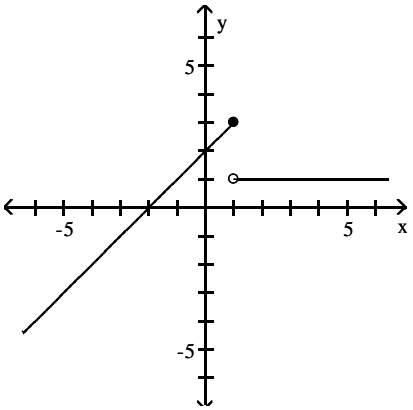

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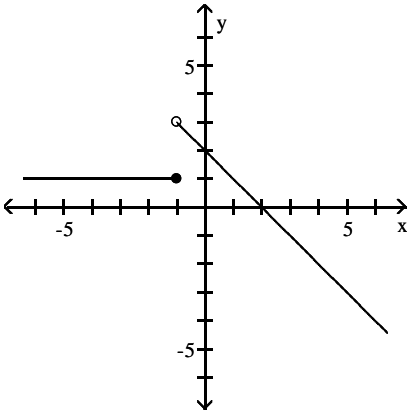
C)



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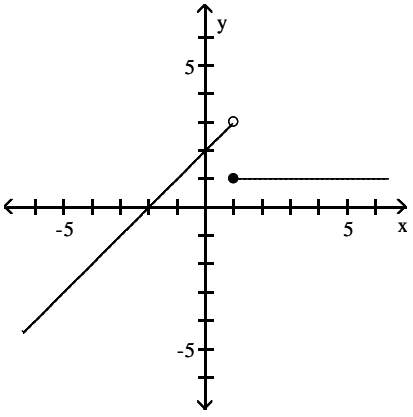
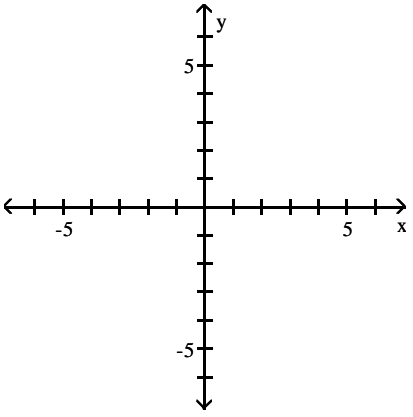


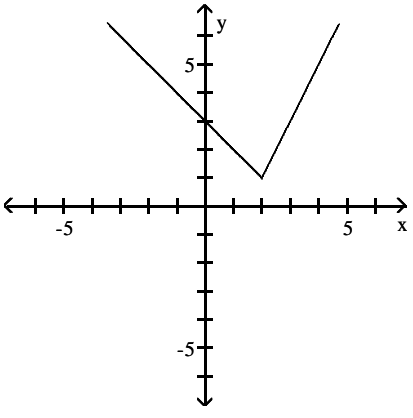
54)

54) _____

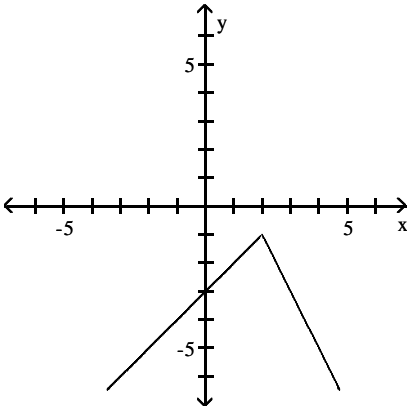
$$f(x) = \begin{cases} -x + 3 & \text{if } x < 2 \\ 2x - 3 & \text{if } x \geq 2 \end{cases}$$



A)



B)



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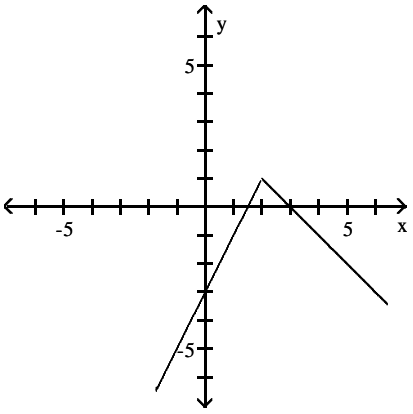
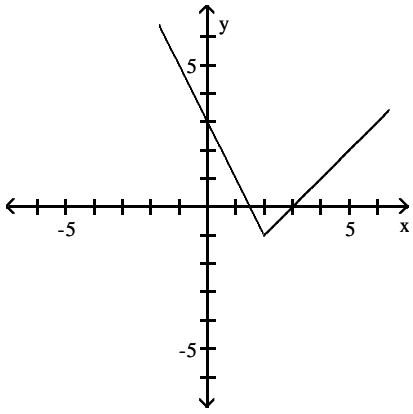
C)

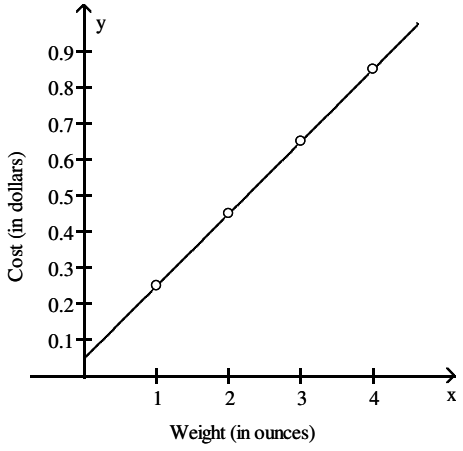


D)

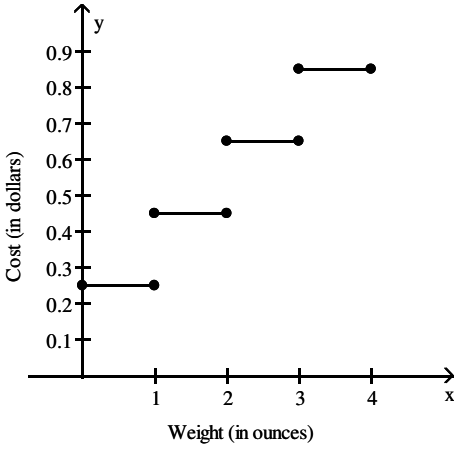


55) Assume it costs 25 cents to mail a letter weighing one ounce or less, and then 20 cents for each additional ounce or fraction of an ounce. Let L(x) be the cost of mailing a letter weighing x ounces. Graph y = L(x). Use the interval (0, 4]. 55) _____

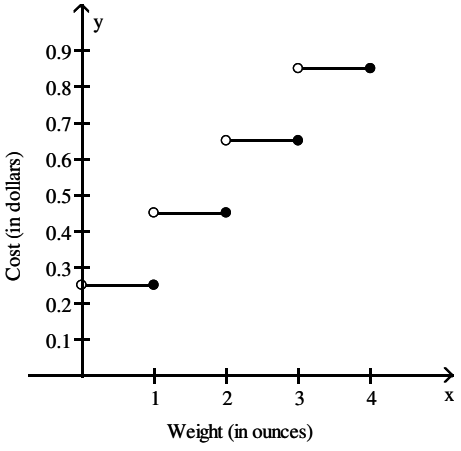
A)



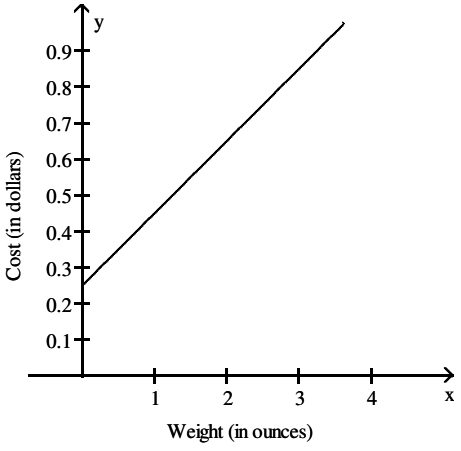
B)



C)



D)



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SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

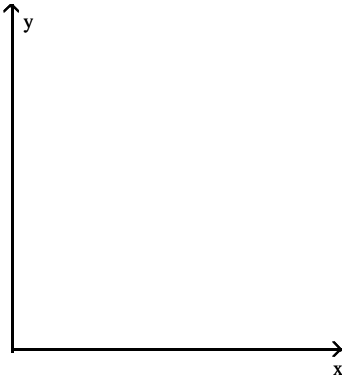
Provide an appropriate response.

56) If $f(x) = \begin{cases} x - 3 & \text{if } x < 2 \\ x^2 & \text{if } x \geq 2 \end{cases}$, what is the definition of g(x), the function whose graph is obtained by shifting f(x)'s graph right 5 units and down 1 unit? 56) _____

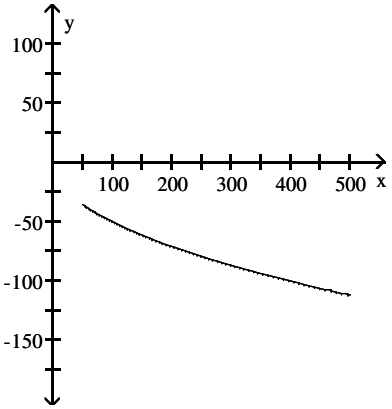
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

57) A retail chain sells washing machines. The retail price p(x) (in dollars) and the weekly demand x for a particular model are related by the function $p(x) = 625 - 5\sqrt{x}$, where $50 \leq x \leq 500$. (i) Describe how the graph of the function p can be obtained from the graph of one of the six basic functions: $y = x$, $y = x^2$, $y = x^3$, $y = \sqrt{x}$, $y = \sqrt[3]{x}$, or $y = |x|$. (ii) Sketch a graph of function p using part (i) as an aid. 57) _____



A) (i) The graph of the basic function $y = \sqrt{x}$ is reflected in the x–axis and vertically expanded by a factor of 5.
(ii)



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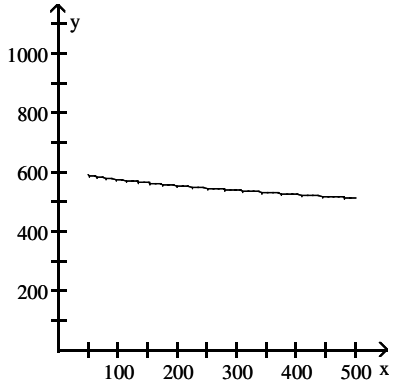
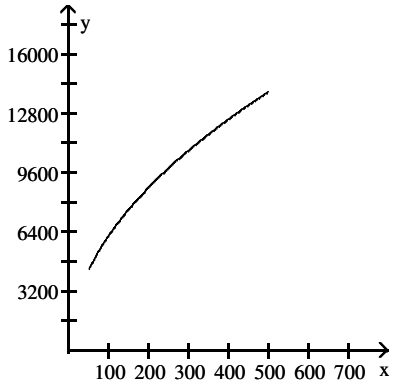
B) (i) The graph of the basic function $y = \sqrt{x}$ is reflected in the x–axis, vertically expanded by a factor of 5, and shifted up 625 units.

(ii)



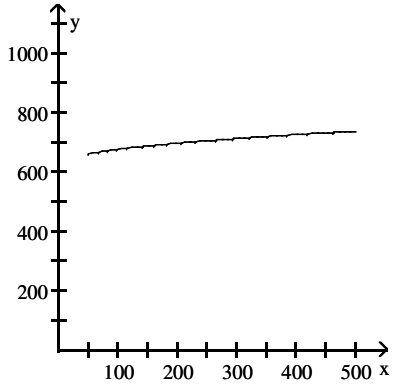
C) (i) The graph of the basic function $y = \sqrt{x}$ is vertically expanded by a factor of 625, and shifted up 5 units.

(ii)



D) (i) The graph of the basic function $y = \sqrt{x}$ is vertically expanded by a factor of 5, and shifted up 625 units.

(ii)



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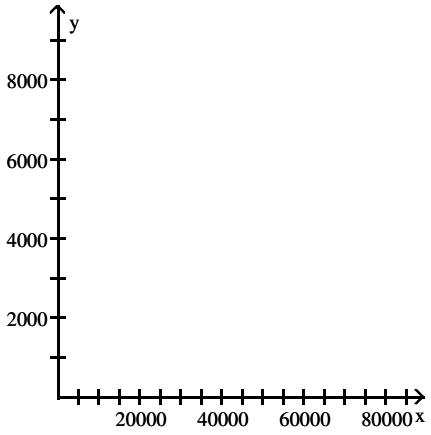
58) The following table shows a recent state income tax schedule for married couples filing a joint return in State X. 58) _____

State X Income Tax

SCHEDULE I – MARRIED FILING JOINTLY

If taxable income is		
Over	But not over	Tax due is
$0	$40,000	4.25% of taxable incomes
$40,000	$70,000	$3700 plus 6.75% of excess over $40,000
$70,000		$3875 plus 7.05% of excess over $70,000

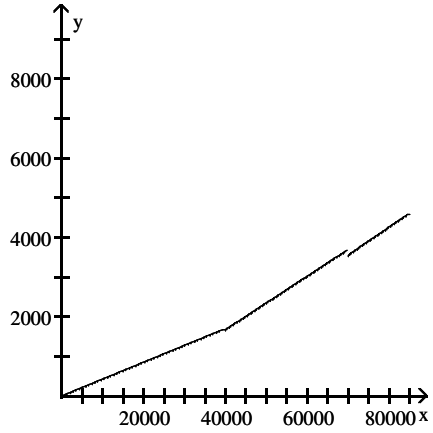
(i) Write a piecewise definition for the tax due T(x) on an income of x dollars. (ii) Graph T(x). (iii) Fir tax due on a taxable income of $50,000. Of $95,000.



A) (i)

$$T(x) = \begin{cases} 0.0425x & \text{if } 0 \le x \le 40{,}000 \\ 0.0675x - 1025 & \text{if } 40{,}000 < x \le 70{,}000 \\ 0.0705x - 1375 & \text{if } x > 70{,}000 \end{cases}$$

(ii)



(iii) $2350; $5322.50

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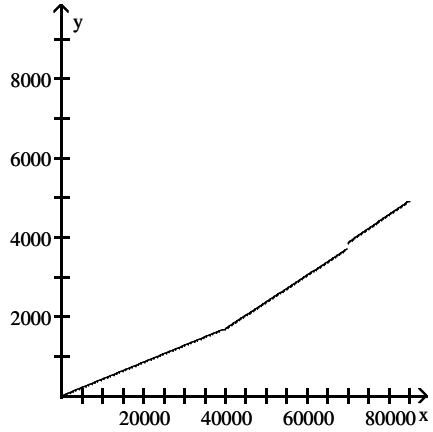
B) (i)

$$T(x) = \begin{cases} 0.0425x & \text{if } 0 \le x \le 40{,}000 \\ 0.0675x - 1000 & \text{if } 40{,}000 < x \le 70{,}000 \\ 0.0705x - 1060 & \text{if } x > 70{,}000 \end{cases}$$

(ii)

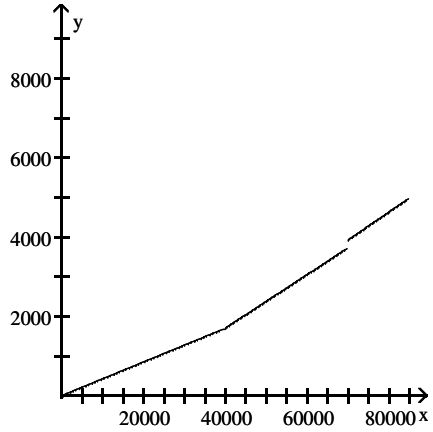


(iii) \$2375; \$5637.50

C) (i)

$$T(x) = \begin{cases} 0.0425x & \text{if } 0 \le x \le 40{,}000 \\ 0.0675x - 990 & \text{if } 40{,}000 < x \le 70{,}000 \\ 0.0705x - 1000 & \text{if } x > 70{,}000 \end{cases}$$

(ii)



(iii) \$2385; \$5697.50

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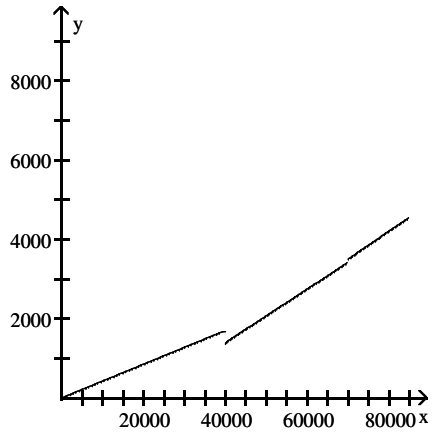
D) (i)

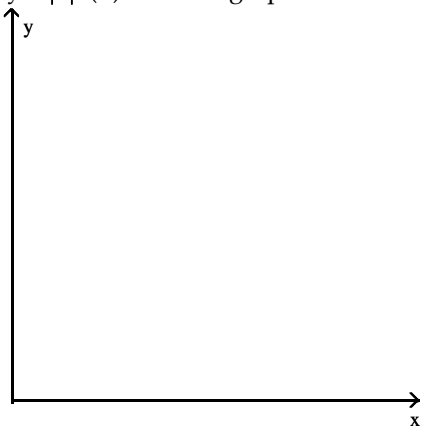
$$T(x) = \begin{cases} 0.0425x & \text{if } 0 \le x \le 40{,}000 \\ 0.0675x - 1300 & \text{if } 40{,}000 < x \le 70{,}000 \\ 0.0705x - 1427 & \text{if } x > 70{,}000 \end{cases}$$

(ii)



(iii) \$2075; \$5270.50

59) The average weight of a particular species of frog is given by $w(x) = 98x^3$, $0.1 \le x \le 0.3$, where x is length (with legs stretched out) in meters and w(x) is weight in grams. (i) Describe how the graph of function w can be obtained from one of the six basic functions: $y = x$, $y = x^2$, $y = x^3$, $y = \sqrt{x}$, $y = \sqrt[3]{x}$, or $y = |x|$. (ii) Sketch a graph of function w using part (i) as an aid. 59) _____



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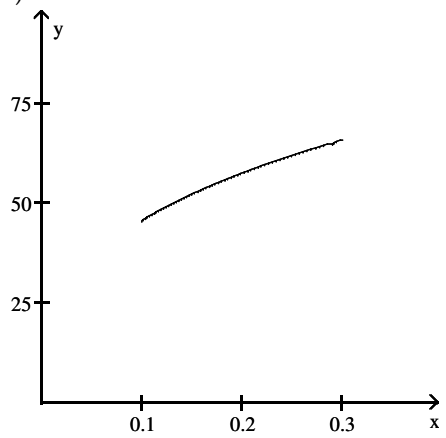
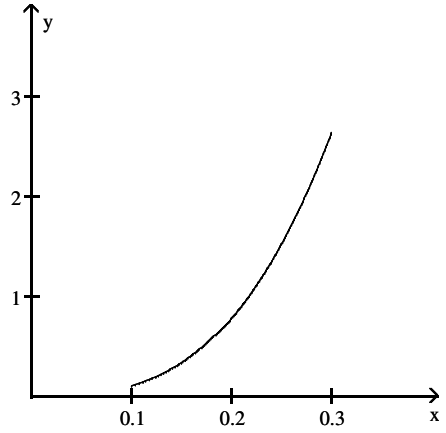
A) (i) The graph of the basic function $y = \sqrt[3]{x}$ is vertically expanded by a factor of 98.

(ii)



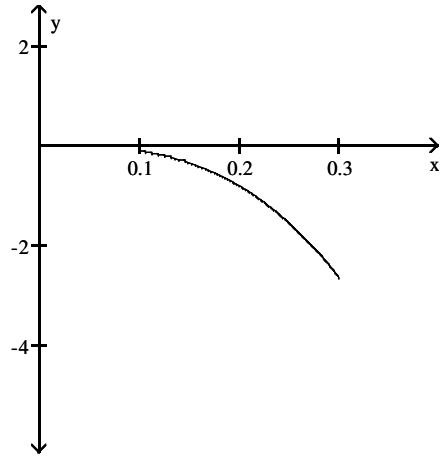
B) (i) The graph of the basic function $y = x^3$ is vertically expanded by a factor of 98.

(ii)



C) (i) The graph of the basic function $y = x^3$ is reflected on the x–axis and is vertically expanded by a factor of 98.

(ii)



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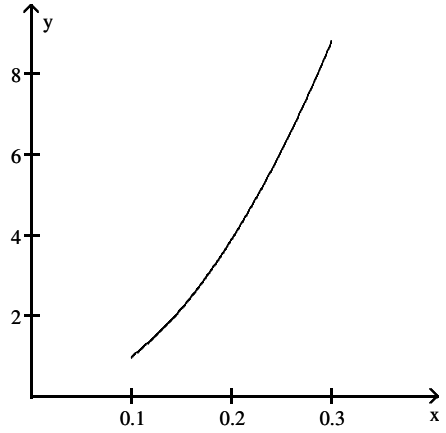
D) (i) The graph of the basic function $y = x^2$ is vertically expanded by a factor of 98.

(ii)



Find the x–intercept(s) if they exist.

60) $x^2 + 6x + 5 = 0$ 60) _____

A) 10, –5 B) 1 , 5 C) $\sqrt{5}, -\sqrt{5}$ D) –1, –5

61) $6x^2 = 42x$ 61) _____

A) 0 B) 0, 7 C) 7 D) 21

For the given function, find each of the following:
(A) Intercepts
(B) Vertex
(C) Maximum or minimum
(D) Range

62) $f(x) = (x + 2)^2 - 9$ 62) _____

A) (A) x–intercepts: – 5, 1; y–intercept: –5
(B) Vertex (–2, –9)
(C) Minimum: –9
(D) $y \geq -9$

B) (A) x–intercepts: – 5, 1; y–intercept: –5
(B) Vertex (–2, –9)
(C) Maximum: –9
(D) $y \leq -9$

C) (A) x–intercepts: – 5, 1; y–intercept: –5
(B) Vertex (2, –9)
(C) Minimum: –9
(D) $y \geq -9$

D) (A) x–intercepts: –1, 5; y–intercept: –5
(B) Vertex (–2, –9)
(C) Minimum: –9
(D) $y \geq -9$

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63) $g(x) = (x - 3)^2 - 1$ 63) _____

A) (A) x–intercepts: 2, 4; y–intercept: 8
(B) Vertex (–3, –1)
(C) Minimum: –1
(D) $y \geq -1$

B) (A) x–intercepts: –4, – 2; y–intercept: 8
(B) Vertex (3, –1)
(C) Minimum: –1
(D) $y \geq -1$

C) (A) x–intercepts: 2, 4; y–intercept: 8
(B) Vertex (3, –1)
(C) Minimum: –1
(D) $y \geq -1$

D) (A) x–intercepts: 2, 4; y–intercept: 8
(B) Vertex (3, –1)
(C) Maximum: –1
(D) $y \leq -1$

64) $m(x) = -(x + 1)^2 + 4$ 64) _____

A) (A) x–intercepts: – 3, 1; y–intercept: 3
(B) Vertex (–1, 4)
(C) Maximum: 4
(D) $y \leq 4$

B) (A) x–intercepts: – 3, 1; y–intercept: 3
(B) Vertex (–1, 4)
(C) Minimum: 4
(D) $y \geq 4$

C) (A) x–intercepts: –1, 3; y–intercept: 3
(B) Vertex (–1, 4)
(C) Maximum: 4
(D) $y \leq 4$

D) (A) x–intercepts: – 3, 1; y–intercept: 3
(B) Vertex (1, –4)
(C) Maximum: 4
(D) $y \leq 4$

65) $n(x) = -(x - 1)^2 + 4$ 65) _____

A) (A) x–intercepts: –3, 1; y–intercept: 3
(B) Vertex (1, 4)
(C) Maximum: 4
(D) $y \leq 4$

B) (A) x–intercepts: – 1, 3; y–intercept: 3
(B) Vertex (–1, –4)
(C) Maximum: 4
(D) $y \leq 4$

C) (A) x–intercepts: – 1, 3; y–intercept: 3
(B) Vertex (1, 4)
(C) Minimum: 4
(D) $y \geq 4$

D) (A) x–intercepts: – 1, 3; y–intercept: 3
(B) Vertex (1, 4)
(C) Maximum: 4
(D) $y \leq 4$

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Find the vertex form for the quadratic function. Then find each of the following:
(A) Intercepts
(B) Vertex
(C) Maximum or minimum
(D) Range

66) $f(x) = x^2 + 2x - 8$ 66) _____

A) Standard form: $f(x) = (x + 1)^2 - 9$
(A) x–intercepts: – 4, 2; y–intercept: –8
(B) Vertex (1, –9)
(C) Minimum: –9
(D) $y \geq -9$

B) Standard form: $f(x) = (x + 1)^2 - 9$
(A) x–intercepts: – 4, 2; y–intercept: –8
(B) Vertex (–1, –9)
(C) Minimum: –9
(D) $y \geq -9$

C) Standard form: $f(x) = (x - 1)^2 - 9$
(A) x–intercepts: – 4, 2; y–intercept: –8
(B) Vertex (–1, –9)
(C) Maximum: –9
(D) $y \leq -9$

D) Standard form: $f(x) = (x - 1)^2 - 9$
(A) x–intercepts: –2, 4; y–intercept: –8
(B) Vertex (–1, –9)
(C) Minimum: –9
(D) $y \geq -9$

67) $g(x) = x^2 - 2x - 3$ 67) _____

A) Standard form: $g(x) = (x + 1)^2 - 4$
(A) x–intercepts: –3, 1; y–intercept: –3
(B) Vertex (1, –4)
(C) Minimum: –4
(D) $y \geq -4$

B) Standard form: $g(x) = (x + 1)^2 - 4$
(A) x–intercepts: – 1, 3; y–intercept: –3
(B) Vertex (1, –4)
(C) Maximum: –4
(D) $y \leq -4$

C) Standard form: $g(x) = (x - 1)^2 - 4$
(A) x–intercepts: – 1, 3; y–intercept: –3
(B) Vertex (1, –4)
(C) Minimum: –4
(D) $y \geq -4$

D) Standard form: $g(x) = (x - 1)^2 - 4$
(A) x–intercepts: – 1, 3; y–intercept: –3
(B) Vertex (–1, –4)
(C) Minimum: –4
(D) $y \geq -4$

68) $m(x) = -x^2 - 6x - 8$ 68) _____

A) Standard form: $m(x) = -(x - 3)^2 + 1$
(A) x–intercepts: 2, 4; y–intercept: –8
(B) Vertex (–3, 1)
(C) Maximum: 1
(D) $y \leq 1$

B) Standard form: $m(x) = -(x - 3)^2 + 1$
(A) x–intercepts: – 4, –2; y–intercept: –8
(B) Vertex (–3, 1)
(C) Minimum: 1
(D) $y \geq 1$

C) Standard form: $m(x) = -(x + 3)^2 + 1$
(A) x–intercepts: – 4, –2; y–intercept: –8
(B) Vertex (–3, 1)
(C) Maximum: 1
(D) $y \leq 1$

D) Standard form: $m(x) = -(x + 3)^2 + 1$
(A) x–intercepts: – 4, –2; y–intercept: –8
(B) Vertex (3, –1)
(C) Maximum: 1
(D) $y \leq 1$

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69) $n(x) = -x^2 + 8x - 7$ 69) _____

A) Standard form: $n(x) = -(x - 4)^2 + 9$
(A) x–intercepts: 1, 7; y–intercept: –7
(B) Vertex (4, 9)
(C) Maximum: 9
(D) $y \le 9$

B) Standard form: $n(x) = -(x + 4)^2 + 9$
(A) x–intercepts: –7, – 1; y–intercept: –7
(B) Vertex (4, 9)
(C) Maximum: 9
(D) $y \le 9$

C) Standard form: $n(x) = -(x - 4)^2 + 9$
(A) x–intercepts: 1, 7; y–intercept: –7
(B) Vertex (–4, –9)
(C) Maximum: 9
(D) $y \le 9$

D) Standard form: $n(x) = -(x + 4)^2 + 9$
(A) x–intercepts: 1, 7; y–intercept: –7
(B) Vertex (4, 9)
(C) Minimum: 9
(D) $y \ge 9$

Determine whether there is a maximum or minimum value for the given function, and find that value.

70) $f(x) = x^2 - 20x + 104$ 70) _____

A) Minimum: 4 B) Maximum: –4 C) Maximum: 10 D) Minimum: 0

71) $f(x) = - x^2 - 18x - 90$ 71) _____

A) Maximum: – 9 B) Minimum: 9 C) Minimum: –9 D) Minimum: 0

Find the range of the given function. Express your answer in interval notation.

72) $f(x) = 4x^2 + 16x + 19$ 72) _____

A) $(-\infty, -3]$ B) $(-\infty, 2]$ C) $[3, \infty)$ D) $[-2, \infty)$

73) $f(x) = -2x^2 + 12x - 23$ 73) _____

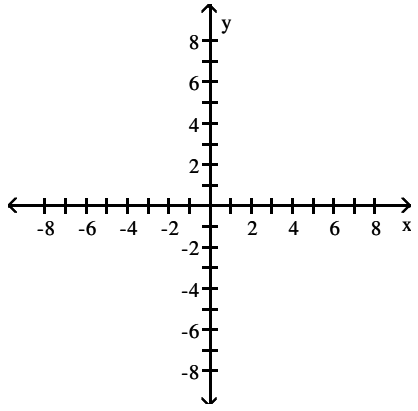
A) $(-\infty, -3]$ B) $(-\infty, -5]$ C) $[5, \infty)$ D) $[-3, \infty)$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

74) Find the vertex and the maximum or minimum of the quadratic function $f(x) = -x^2 - 4x + 5$ by first writing f in standard form. State the range of f and find the intercepts of f . 74) _____

75) Graph $f(x) = -x^2 - x + 6$ and indicate the maximum or minimum value of f(x), whichever ex 75) _____



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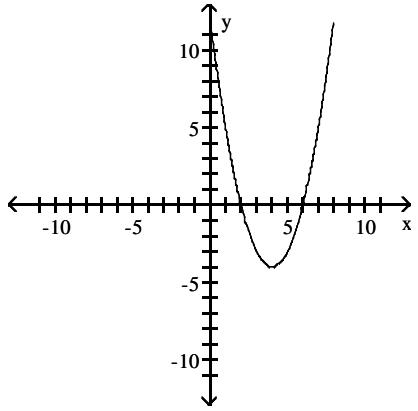
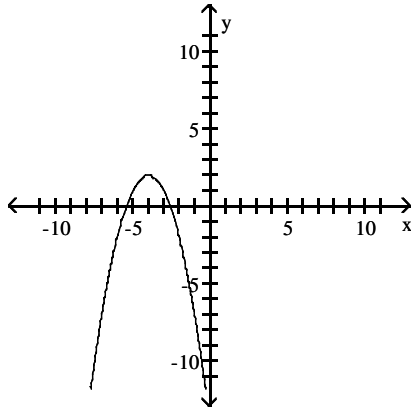
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Write an equation for the graph in the form $y = a(x - h)^2 + k$, where a is either 1 or –1 and h and k are integers.

76) 

76) _____

A) $y = (x + 4)^2 + 6$ B) $y = (x - 4)^2 - 4$ C) $y = (x - 4)^2 - 6$ D) $y = (x - 6)^2 - 4$

77) 

77) _____

A) $y = -(x + 4)^2 + 2$ B) $y = (x + 4)^2 + 2$ C) $y = (x + 4)^2 - \frac{1}{3}$ D) $y = -(x - 4)^2 - 2$

Solve graphically to two decimal places using a graphing calculator.

78) $1.7x^2 - 2.6x - 3.9 > 0$ 78) _____

A) $x < -0.93$ or $x > 2.46$ B) $x < -2.46$ or $x > 0.93$

C) $-2.46 < x < 0.93$ D) $-0.93 < x < 2.46$

79) $1.5x^2 - 4.7x - 2.9 \leq 0$ 79) _____

A) $x < -3.66$ or $x > 0.53$ B) $-3.66 < x < 0.53$

C) $-0.53 < x < 3.66$ D) $x < -0.53$ or $x > 3.66$

Solve the equation graphically to four decimal places.

80) Let $f(x) = -0.6x^2 + 3x + 1$, find $f(x) = 3$. 80) _____

A) 0.7922 B) 0.7922, 4.2078 C) 4.2078 D) No solution

81) Let $f(x) = -0.4x^2 + 2x + 3$, find $f(x) = -5$. 81) _____

A) –2.6235 B) –2.6235, 7.6235 C) No solution D) 7.6235

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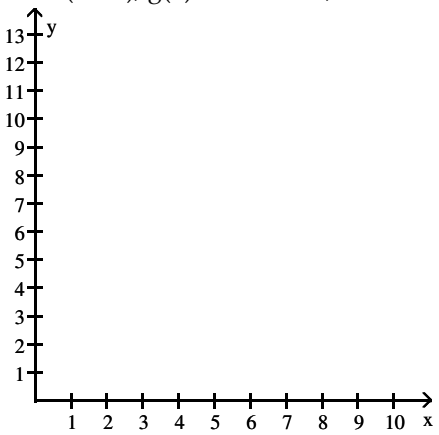
82) Let $f(x) = -0.5x^2 + 4x + 2$, find $f(x) = 11$. 82) _____

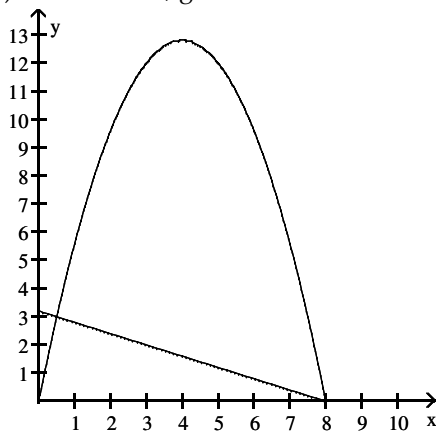
A) No solution B) 10.0000 C) 4.0000, 10.0000 D) 4.0000

For the following problem, (i) graph f and g in the same coordinate system; (ii) solve f(x) = g(x) algebraically to two decimal places; (iii) solve f(x) > g(x) using parts i and ii; (iv) solve f(x) < g(x) using parts i and ii.

83) $f(x) = -0.8x(x - 8)$, $g(x) = 0.4x + 3.2$; $0 \le x \le 10$ 83) _____

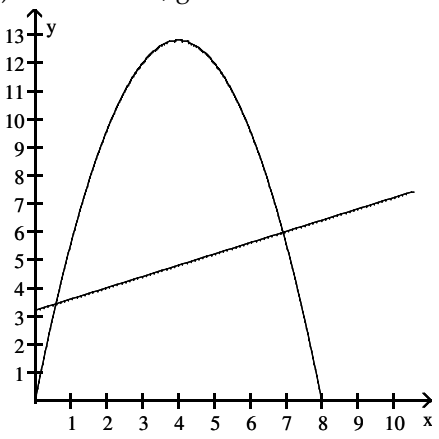


A) (i) f is the curve, g is the line



(ii) 0.58, 7.98
(iii) $0.58 < x < 7.98$
(iv) $0 \le x < 0.58$ or $7.98 < x \le 8$

B) (i) f is the curve, g is the line



(ii) 0.58, 6.92
(iii) $0.58 < x < 6.92$
(iv) $0 \le x < 0.58$ or $6.92 < x \le 8$

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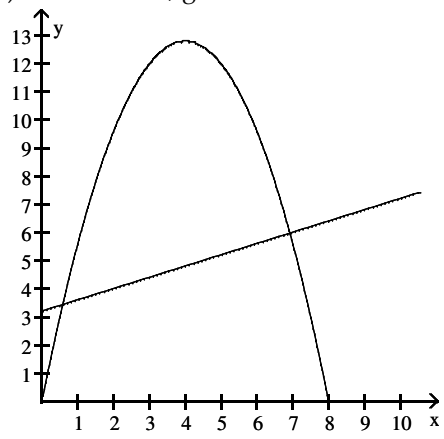
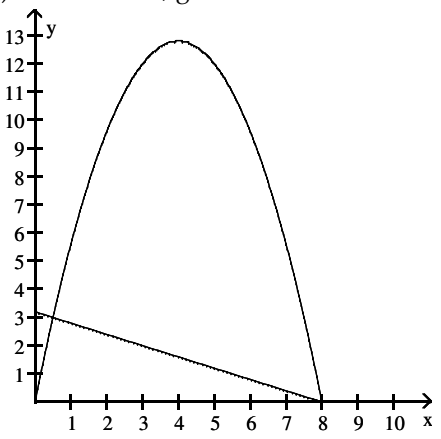
C) (i) f is the curve, g is the line



(ii) 0.61, 7.02
(iii) $0.61 < x < 7.02$
(iv) $0 \le x < 0.61$ or $7.02 < x \le 8$

D) (i) f is the curve, g is the line



(ii) 0.61, 7.98
(iii) $0.61 < x < 7.98$
(iv) $0 \le x < 0.61$ or $7.98 < x \le 8$

Solve the problem.

84) In economics, functions that involve revenue, cost and profit are used. Suppose R(x) and C(x) denote the total revenue and the total cost, respectively, of producing a new high–tech widget. The difference P(x) = R(x) – C(x) represents the total profit for producing x widgets. Given $R(x) = 60x - 0.4x^2$ and $C(x) = 3x + 13$, find the equation for P(x). 84) _____

A) $P(x) = 3x + 13$
B) $P(x) = -0.4x^2 + 63x + 13$
C) $P(x) = 60x - 0.4x^2$
D) $P(x) = -0.4x^2 + 57x - 13$

85) In economics, functions that involve revenue, cost and profit are used. Suppose R(x) and C(x) denote the total revenue and the total cost, respectively, of producing a new high–tech widget. The difference P(x) = R(x) – C(x) represents the total profit for producing x widgets. Given $R(x) = 60x - 0.4x^2$ and $C(x) = 3x + 13$, find P(100). 85) _____

A) 2000 B) 313 C) 55687 D) 1687

86) A professional basketball player has a vertical leap of 37 inches. A formula relating an athlete's vertical leap V, in inches, to hang time T, in seconds, is $V = 48T^2$. What is his hang time? Round to the nearest tenth. 86) _____

A) 0.9 sec B) 0.6 sec C) 1 sec D) 0.8 sec

87) Under certain conditions, the power P, in watts per hour, generated by a windmill with winds blowing v miles per hour is given by $P(v) = 0.015v^3$. Find the power generated by 18–mph winds. 87) _____

A) 0.00006075 watts per hour
B) 87.48 watts per hour
C) 4.86 watts per hour
D) 58.32 watts per hour

88) The U. S. Census Bureau compiles data on population. The population (in thousands) of a southern city can be approximated by $P(x) = 0.08x^2 - 13.08x + 927$, where x corresponds to the years after 1950. In what calendar year was the population about 804,200? 88) _____

A) 1960 B) 1955 C) 2000 D) 1965

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89) Assume that a person's critical weight W, defined as the weight above which the risk of death rises dramatically, is given by $W(h) = \left(\frac{h}{11.9}\right)^3$, where W is in pounds and h is the person's height in inches. Find the tcritical weight for a person who is 6 ft 11 in. tall. Round to the nearest tenth. 89) _____

A) 339.3 lb B) 212.4 lb C) 377.4 lb D) 221.5 lb

90) The polynomial $0.0053x^3 + 0.003x^2 + 0.108x + 1.54$ gives the approximate total earnings of a company, in millions of dollars, where x represents the number of years since 1996. This model is valid for the years from 1996 to 2000. Determine the earnings for 2000. Round to 2 decimal places. 90) _____

A) \$2.26 million B) \$2.36 million C) \$2.03 million D) \$2.82 million

Use the REGRESSION feature on a graphing calculator.

91) The average retail price in the Spring of 2000 for a used Camaro Z28 coupe depends on the age of th as shown in the following table. 91) _____

Age, x	1	2	3	4	5	6	7	8	9
Price, y	18,325	15,925	13,685	11,805	10,490	8885	8015	6480	5710

Find the quadratic model that best estimates this data. Round your answer to whole numbers.

A) $y = 102x^2 - 2576x + 20{,}669$ B) $y = 102x^2 - 2576x$

C) $y = -9x^3 + 235x^2 - 3134x + 21{,}252$ D) $y = -1551x + 18{,}790x$

92) As the number of farms has decreased in South Carolina, the average size of the remaining farms ha grown larger, as shown below. 92) _____

YEAR	AVERAGE ACREAGE PER FARM
1900 (x = 0)	127
1910 (x = 10)	119
1920	135
1930	137
1940	155
1950	196
1960	283
1970	353
1980	406
1990	440
2000 (x = 100)	420

Let x represent the number of years since 1900. Use a graphing calculator to fit a quadratic function t data. Round your answer to five decimal places.

A) $y = 0.02536x^3 + 1.21114x + 102.58741$

B) $y = 0.02536x^3 + 1.21114 + 102.58741$

C) $y = -.00114x^3 + 0.19605x^2 - 5.29775 + 143.55245$

D) $y = 0.02536x^2 + 1.21114x + 102.58741$

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93) Since 1984 funeral directors have been regulated by the Federal Trade Commission. The average co 93) _____
funeral for an adult in a Midwest city has increased, as shown in the following table.

YEAR	AVERAGE COST OF FUNERAL
1980	$ 1926
1985	$ 2841
1991	$ 3842
1995	$ 4713
1996	$ 4830
1998	$ 5120
2001	$ 5340

Let x represent the number of years since 1980. Use a graphing calculator to fit a quartic function to t
data. Round your answer to five decimal places.

A) $y = -0.04268x^4$

B) $y = -0.04268x^4 + 1.53645x^3 - 16.76289x^2 + 231.82723x + 1927.58518$

C) $y = 170.5971x + 1991.5213$

D) $y = -2.047489x^2 + 212.82699x + 1879.85469$

Solve the problem.

94) The population P, in thousands, of Fayetteville is given by $P(t) = \frac{300t}{2t^2 + 7}$, where t is the time, in 94) _____
months. Find the population at 9 months.

A) 7988 B) 30, 769 C) 40,000 D) 15, 976

95) If the average cost per unit C(x) to produce x units of plywood is given by $C(x) = \frac{1200}{x + 40}$, what is the 95) _____
unit cost for 10 units?

A) $3.00 B) $80.00 C) $24.00 D) $120.00

96) Suppose the cost per ton, y, to build an oil platform of x thousand tons is approximated by 96) _____
$C(x) = \frac{212{,}500}{x + 425}$. What is the cost per ton for x = 30?

A) $16.67 B) $425.00 C) $467.03 D) $7083.33

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

97) The financial department of a company that produces digital cameras arrived at the 97) _____
following price–demand function and the corresponding revenue function:

$p(x) = 95.4 - 6x$ price–demand
$R(x) = x \cdot p(x) = x(95.4 - 6x)$ revenue function

The function p(x) is the wholesale price per camera at which x million cameras can be sold a
R(x) is the corresponding revenue (in million dollars). Both functions have domain $1 \le x \le 15$
They also found the cost function to be C(x) = 150 + 15.1x (in million dollars) for
manufacturing and selling x cameras. Find the profit function and determine the
approximate number of cameras, rounded to the nearest hundredths, that should be sold
for maximum profit.

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98) The financial department of a company that manufactures portable MP3 players arrived at the following daily cost equation for manufacturing x MP3 players per day: $C(x) = 1500 + 105x + x^2$. The average cost per unit at a production level of players per day is $\overline{C}(x) = \frac{C(x)}{x}$. 98) _____

(A) Find the rational function $\overline{C}$.
(B) Graph the average cost function on a graphing utility for $10 \le x \le 200$.
(C) Use the appropriate command on a graphing utility to find the daily production level (t nearest integer) at which the average cost per player is a minimum. What is the minimum average cost (to the nearest cent)?

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

For the polynomial function find the following: (i) Degree of the polynomial; (ii) All x intercepts; (iii) The y intercept.

99) $y = 8x + 5$ 99) _____

A) (i) 1
(ii) $\frac{5}{8}$
(iii) 5

B) (i) 1
(ii) $-\frac{8}{5}$
(iii) 8

C) (i) 1
(ii) $-\frac{5}{8}$
(iii) 5

D) (i) 1
(ii) 5
(iii) $\frac{5}{8}$

100) $y = x^2 - 49$ 100) _____

A) (i) 1
(ii) 7
(iii) –49

B) (i) 2
(ii) –7, 7
(iii) –49

C) (i) 1
(ii) 24.5
(iii) –49

D) (i) 2
(ii) –8, 8
(iii) –49

101) $y = x^2 + 5x - 50$ 101) _____

A) (i) 2
(ii) 10, 5
(iii) –50

B) (i) 2
(ii) 10, –5
(iii) –50

C) (i) 2
(ii) –10, 5
(iii) –50

D) (i) 2
(ii) –10, 1
(iii) –50

102) $y = 18 - x^2 + 3x$ 102) _____

A) (i) 2
(ii) 3, –6
(iii) –18

B) (i) 2
(ii) –3, –6
(iii) –18

C) (i) 2
(ii) 6, –3
(iii) 18

D) (i) 2
(ii) 6, 3
(iii) 18

103) $y = (x + 10)(x + 6)(x + 6)$ 103) _____

A) (i) 3
(ii) –10, –6, –6
(iii) 360

B) (i) 3
(ii) –10, –6, –6
(iii) –36

C) (i) 3
(ii) 10, 6, 6
(iii) 36

D) (i) 3
(ii) 10, 6, 6
(iii) 360

104) $f(x) = (x^6 + 7)(x^{10} + 9)$ 104) _____

A) (i) 16
(ii) 7, 9
(iii) 63

B) (i) 60
(ii) 7, 9
(iii) –63

C) (i) 16
(ii) none
(iii) 63

D) (i) 60
(ii) none
(iii) –63

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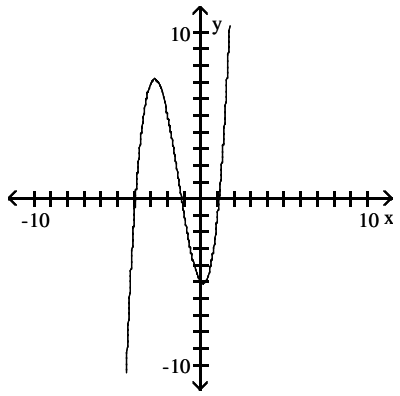
The graph that follows is the graph of a polynomial function. (i) What is the minimum degree of a polynomial function that could have the graph? (ii) Is the leading coefficient of the polynomial negative or positive?

105) 105) _____



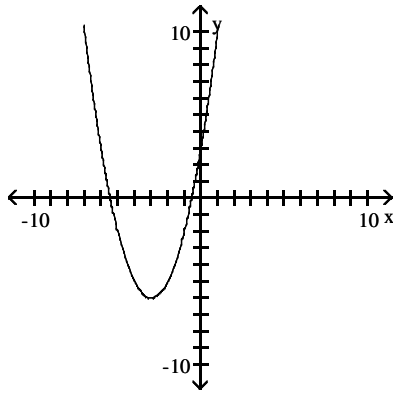
A) (i) 2
(ii) Positive

B) (i) 3
(ii) Negative

C) (i) 2
(ii) Negative

D) (i) 3
(ii) Positive

106) 106) _____



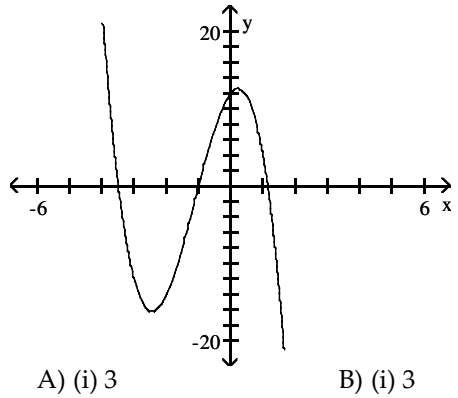
A) (i) 3
(ii) Negative

B) (i) 2
(ii) Positive

C) (i) 2
(ii) Negative

D) (i) 3
(ii) Positive

107) 107) _____



A) (i) 3
(ii) Positive

B) (i) 3
(ii) Negative

C) (i) 4
(ii) Positive

D) (i) 4
(ii) Negative

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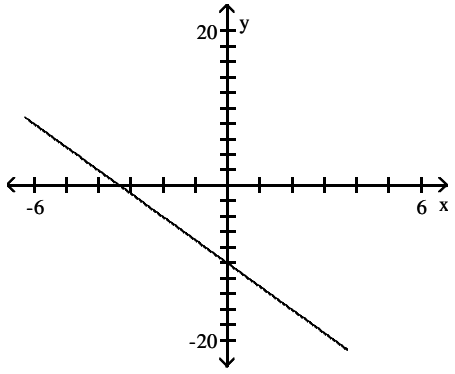
108) 108) _____



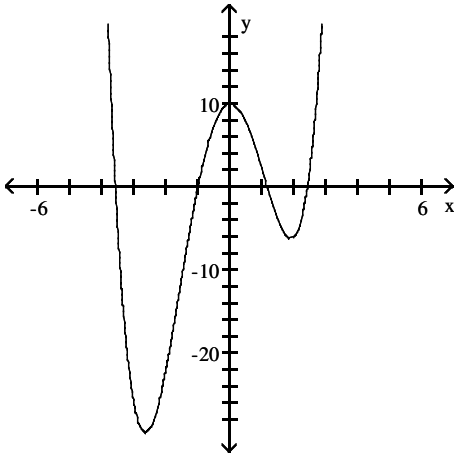
A) (i) 2
(ii) Negative

B) (i) 1
(ii) Positive

C) (i) 2
(ii) Positive

D) (i) 1
(ii) Negative

109) 109) _____



A) (i) 4
(ii) Positive

B) (i) 4
(ii) Negative

C) (i) 3
(ii) Positive

D) (i) 3
(ii) Negative

Provide an appropriate response.

110) What is the maximum number of x intercepts that a polynomial of degree 10 can have? 110) _____

A) 11
B) 9
C) 10
D) Not enough information is given.

111) What is the minimum number of x intercepts that a polynomial of degree 11 can have? Explain. 111) _____

A) 1 because a polynomial of odd degree crosses the x axis at least once.
B) 11 because this is the degree of the polynomial.
C) 0 because a polynomial of odd degree may not cross the x axis at all.
D) Not enough information is given.

112) What is the minimum number of x intercepts that a polynomial of degree 8 can have? Explain. 112) _____

A) 8 because this is the degree of the polynomial.
B) 0 because a polynomial of even degree may not cross the x axis at all.
C) 1 because a polynomial of even degree crosses the x axis at least once.
D) Not enough information is given.

For the rational function below (i) Find the intercepts for the graph; (ii) Determine the domain; (iii) Find any vertical or horizontal asymptotes for the graph; (iv) Sketch any asymptotes as dashed lines. Then sketch the graph of y = f(x).

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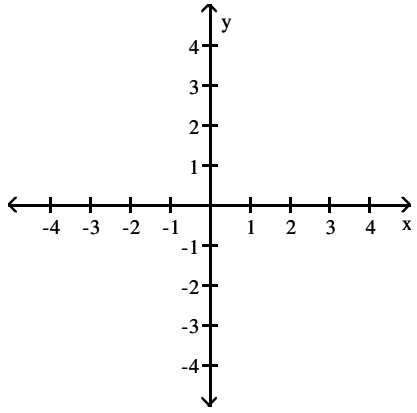
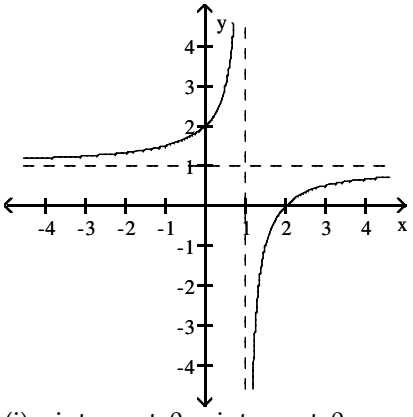
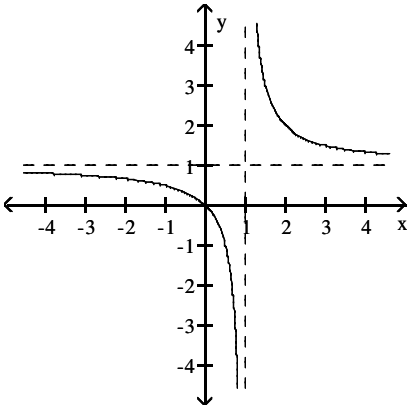
113) $f(x) = \dfrac{x + 2}{x + 1}$ 113) _____



A) (i) x intercept: 2; y intercept: 2
(ii) Domain: all real numbers except 1
(iii) Vertical asymptote: x = 1; horizontal asymptote: y = 1
(iv)



B) (i) x intercept: 0; y intercept: 0
(ii) Domain: all real numbers except 1
(iii) Vertical asymptote: x = 1; horizontal asymptote: y = 1
(iv)



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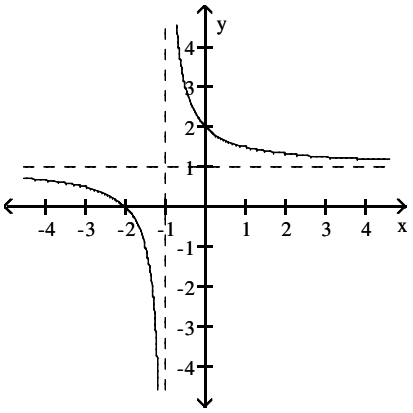
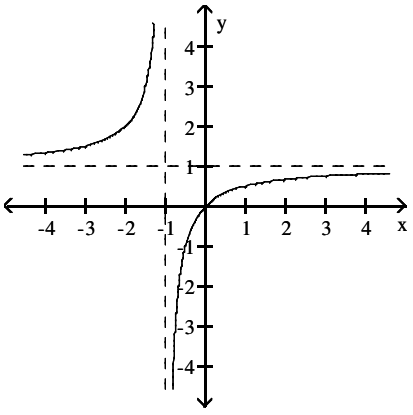
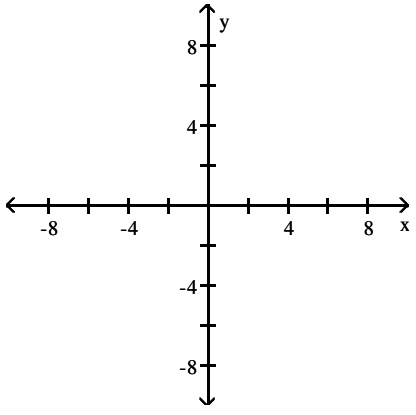
C) (i) x intercept: –2; y intercept: 2
(ii) Domain: all real numbers except –1
(iii) Vertical asymptote: x = –1; horizontal asymptote: y = 1
(iv)



D) (i) x intercept: 0; y intercept: 0
(ii) Domain: all real numbers except –1
(iii) Vertical asymptote: x = –1; horizontal asymptote: y = 1
(iv)



114) $f(x) = \dfrac{x - 3}{x - 4}$ 114) _____



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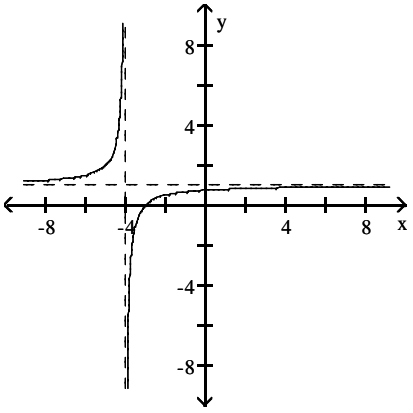
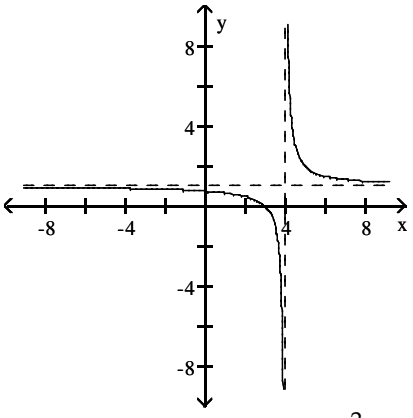
A) (i) x intercept: –3; y intercept: $\frac{3}{4}$

(ii) Domain: all real numbers except –4
(iii) Vertical asymptote: x = –4; horizontal asymptote: y = 1
(iv)



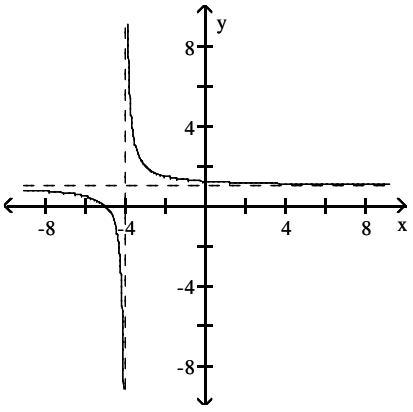
B) (i) x intercept: 3; y intercept: $\frac{3}{4}$

(ii) Domain: all real numbers except 4
(iii) Vertical asymptote: x = 4; horizontal asymptote: y = 1
(iv)



C) (i) x intercept: –5; y intercept: $\frac{3}{4}$

(ii) Domain: all real numbers except –4
(iii) Vertical asymptote: x = –4; horizontal asymptote: y = 1
(iv)



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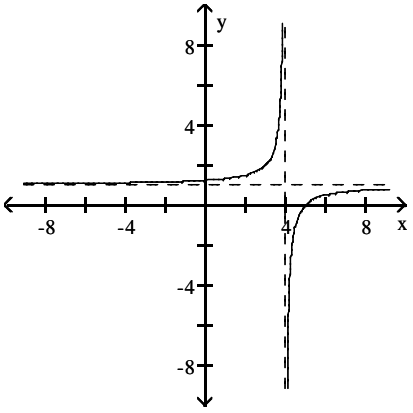
D) (i) x intercept: 5; y intercept: $\frac{3}{4}$

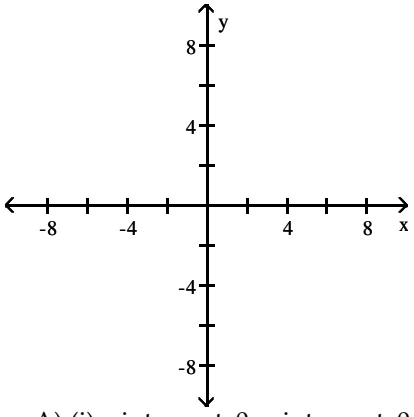
(ii) Domain: all real numbers except 4

(iii) Vertical asymptote: x = 4; horizontal asymptote: y = 1

(iv)



115) $f(x) = \frac{3x}{x - 2}$ 115) _____

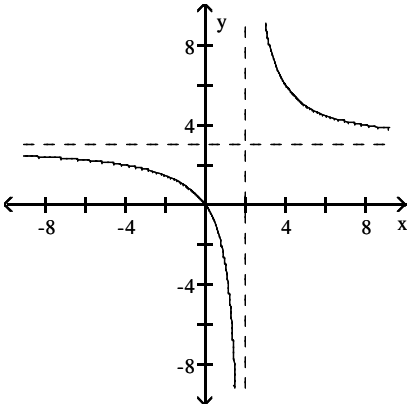


A) (i) x intercept: 0; y intercept: 0

(ii) Domain: all real numbers except 2

(iii) Vertical asymptote: x = 2; horizontal asymptote: y = 3

(iv)



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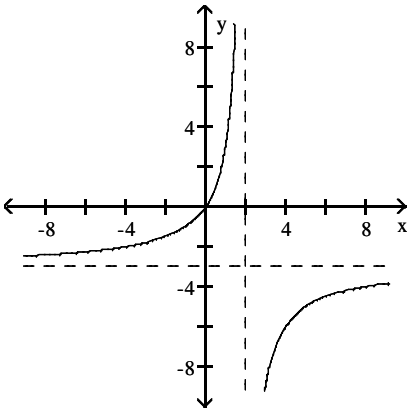
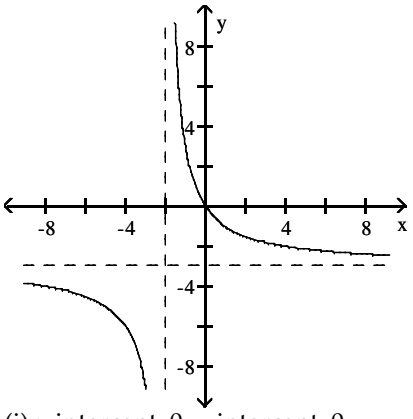
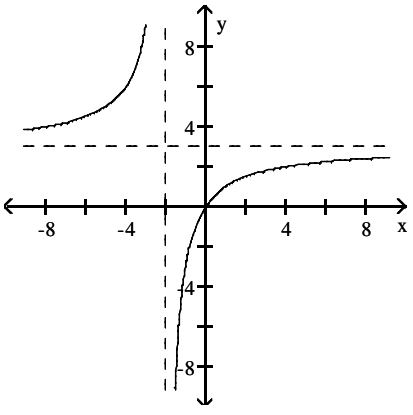
B) (i) x intercept: 0; y intercept: 0
(ii) Domain: all real numbers except 2
(iii) Vertical asymptote: x = 2; horizontal asymptote: y = –3
(iv)



C) (i) x intercept: 0; y intercept: 0
(ii) Domain: all real numbers except –2
(iii) Vertical asymptote: x = –2; horizontal asymptote: y = –3
(iv)



D) (i) x intercept: 0; y intercept: 0
(ii) Domain: all real numbers except –2
(iii) Vertical asymptote: x = –2; horizontal asymptote: y = 3
(iv)



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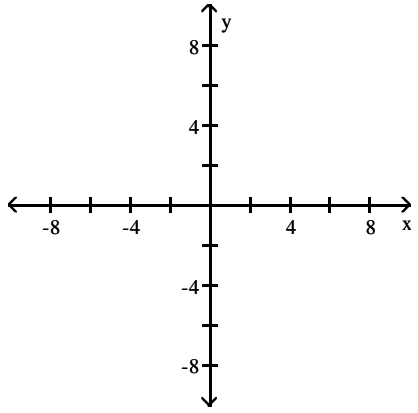
116) $f(x) = \dfrac{-2x - 3}{x + 2}$ 116) _____

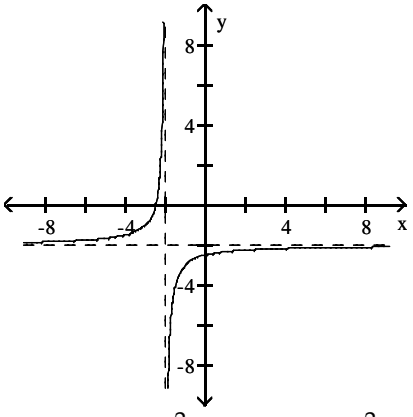


A) (i) x intercept: $-\dfrac{3}{2}$; y intercept: $-\dfrac{3}{2}$

(ii) Domain: all real numbers except –2

(iii) Vertical asymptote: x = –2; horizontal asymptote: y = –2

(iv)

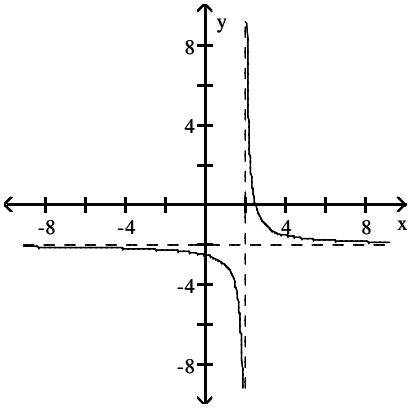


B) (i) x intercept: $\dfrac{3}{2}$; y intercept: $-\dfrac{3}{2}$

(ii) Domain: all real numbers except 2

(iii) Vertical asymptote: x = 2; horizontal asymptote: y = –2

(iv)



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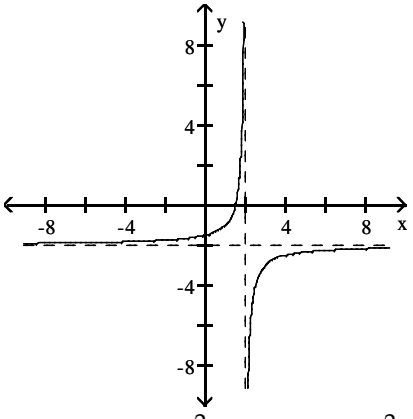
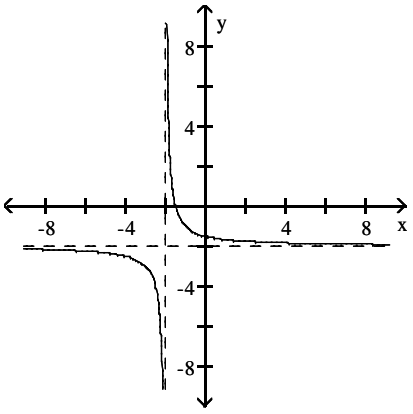
C) (i) x intercept: $\frac{3}{2}$; y intercept: $-\frac{3}{2}$

(ii) Domain: all real numbers except 2
(iii) Vertical asymptote: x = 2; horizontal asymptote: y = –2
(iv)



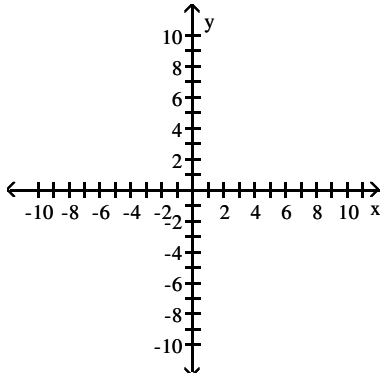
D) (i) x intercept: $-\frac{3}{2}$; y intercept: $-\frac{3}{2}$

(ii) Domain: all real numbers except –2
(iii) Vertical asymptote: x = –2; horizontal asymptote: y = –2
(iv)



For the rational function below (i) Find any intercepts for the graph; (ii) Find any vertical and horizontal asymptotes for the graph; (iii) Sketch any asymptotes as dashed lines. Then sketch a graph of f.

117) $y = \frac{18}{x^2 - 9}$ 117) _____



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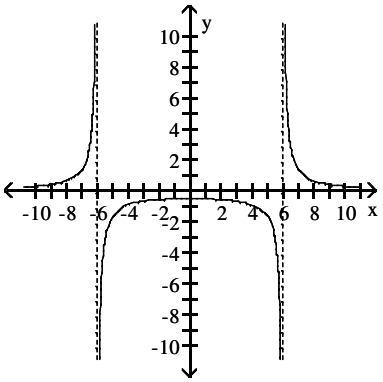
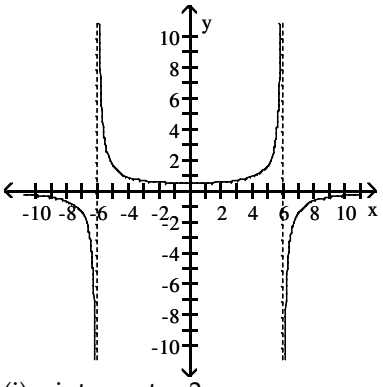
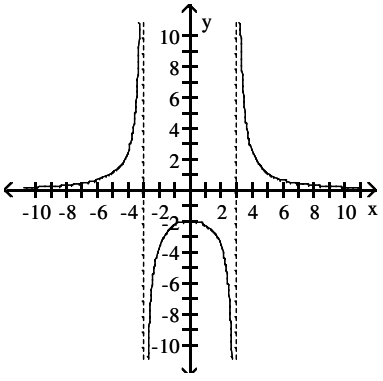
A) (i) y intercept: –6
(ii) horizontal asymptote: y = 0; vertical asymptotes: x = 6 and x = –6
(iii)



B) (i) y intercept: 6
(ii) horizontal asymptote: y = 0; vertical asymptotes: x = 6 and x = –6
(iii)



C) (i) y intercept: – 2
(ii) horizontal asymptote: y = 0; vertical asymptotes: x = 3 and x = –3
(iii)



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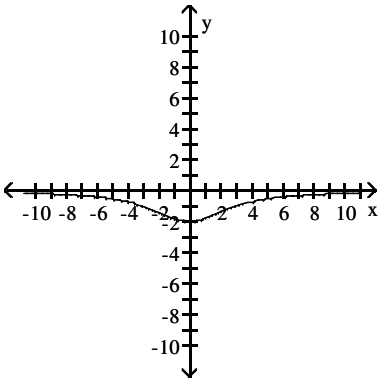
D) (i) y intercept: – 2
(ii) horizontal asymptote: y = 0
(iii)



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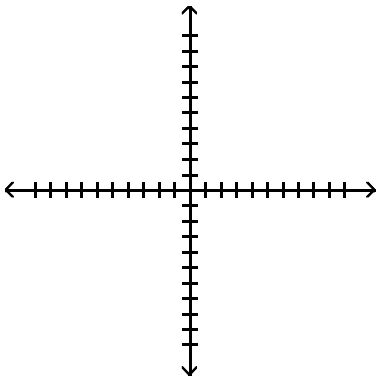
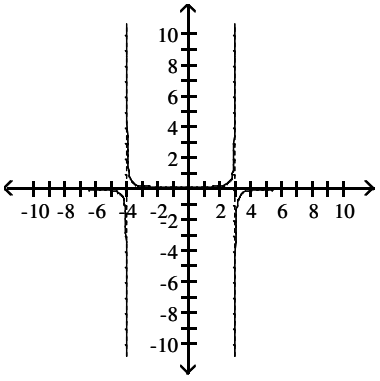
Sketch the graph of the function.

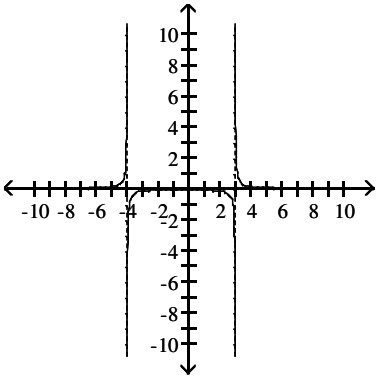
118) $f(x) = \dfrac{x + 1}{x^2 + x - 12}$ 118) _____



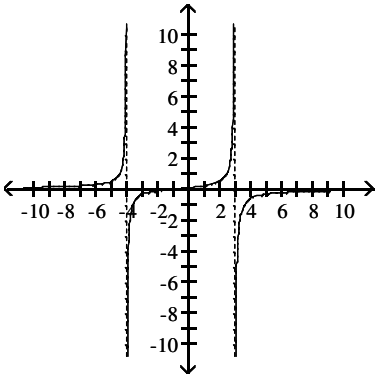
A)



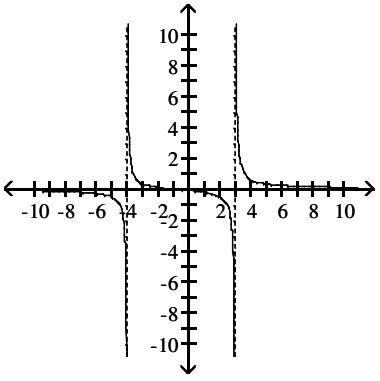
B)



C)



D)



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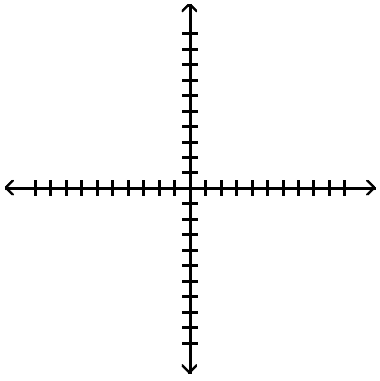
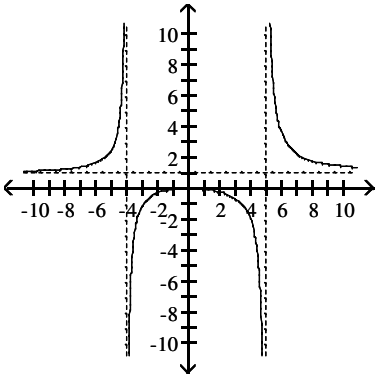
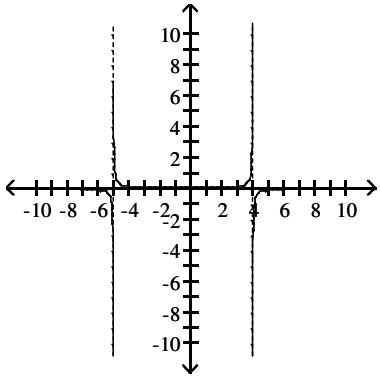
119) $f(x) = \dfrac{x^2}{x^2 - x - 20}$ 119) _____



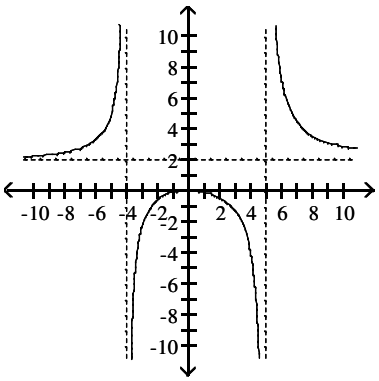
A)



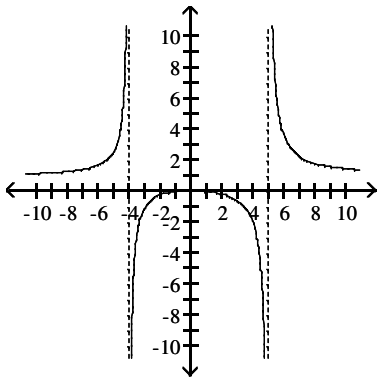
B)



C)



D)



Find the equation of any horizontal asymptote.

120) $f(x) = \dfrac{2x^2 - 7x - 9}{5x^2 - 3x + 6}$ 120) _____

A) $y = \dfrac{7}{3}$ B) $y = 0$ C) $y = \dfrac{2}{5}$ D) None

121) $f(x) = \dfrac{6x^2 + 6}{6x^2 - 6}$ 121) _____

A) $y = -6$ B) $y = 1$ C) $y = 6$ D) None

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122) $f(x) = \frac{x^2 + 4x - 8}{x - 8}$ 122) _____

A) None B) $y = 3$ C) $y = 8$ D) $y = -4$

Find the equations of any vertical asymptotes.

123) $f(x) = \frac{3x - 11}{x^2 + 3x - 4}$ 123) _____

A) $y = 1, y = -4$ B) $x = 1, x = -4$ C) $y = 3$ D) $x = -1, x = 4$

124) $f(x) = \frac{x^2 - 100}{(x - 5)(x + 8)}$ 124) _____

A) $x = -5$ B) $x = 10, x = -10$ C) $x = 5, x = -8$ D) $y = 5, y = -8$

125) $f(x) = \frac{x^2 + 4x}{x^2 - 2x - 24}$ 125) _____

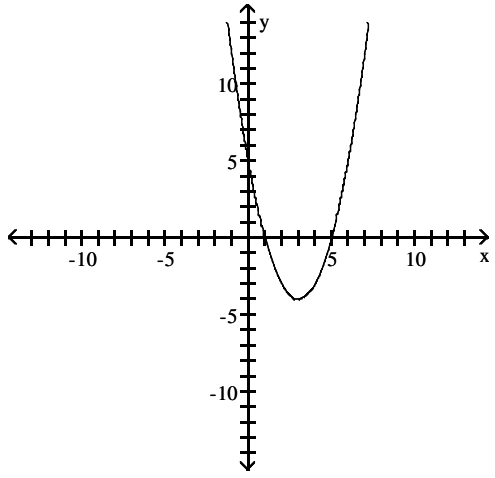
A) $x = 6$ B) $x = -6, x = 4$ C) $x = 6, x = -4$ D) None

126) $f(x) = \frac{x - 4}{x^2 + 8}$ 126) _____

A) $x = 2, x = -2$ B) $x = -8$ C) $x = 8$ D) None

Write an equation for the lowest–degree polynomial function with the graph and intercepts shown in the figure.

127) 127) _____



A) $f(x) = x^2 - 6x + 5$ B) $f(x) = x^2 + 5x - 6$

C) $f(x) = x^2 + 5x + 6$ D) $f(x) = x^2 + 6x + 5$

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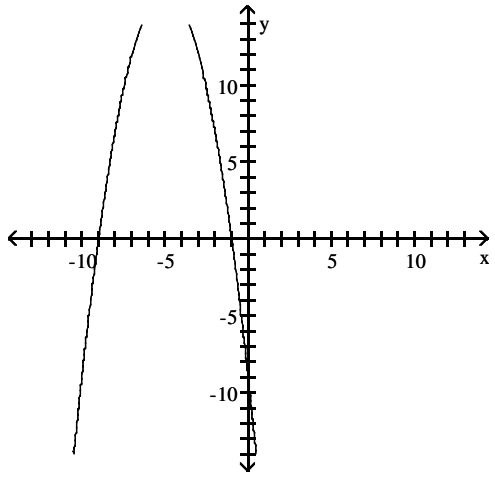
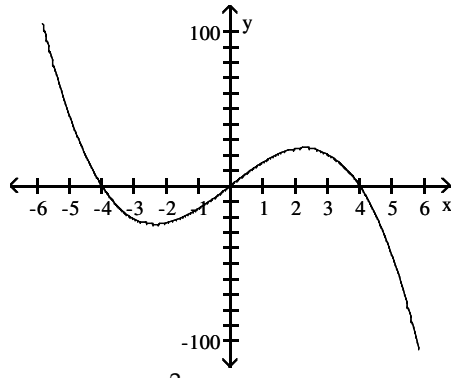
128) 128) _____



A) $f(x) = -x^2 - 10x - 9$ B) $f(x) = x^2 + 9x + 10$

C) $f(x) = x^2 + 10x + 9$ D) $f(x) = x^2 + 9x - 10$

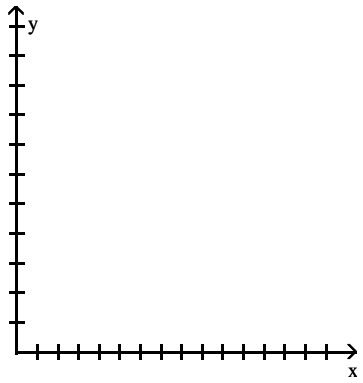
129) 129) _____



A) $f(x) = -x^3 + 16x$ B) $f(x) = -x^3 - 16x$ C) $f(x) = -x^3 - 16x$ D) $f(x) = x^3 + 16x$

Solve the problem.

130) Financial analysts in a company that manufactures ovens arrived at the following daily cost equation for manufacturing x ovens per day: $C(x) = x^2 + 4x + 1800$. The average cost per unit at a production level of x ovens per day is $\overline{C}(x) = C(x)/x$. (i) Find the rational function $\overline{C}$. (ii) Sketch a graph of $\overline{C}(x)$ for $10 \le x \le 125$. (iii) For what daily production level (to the nearest integer) is the average cost per unit at a minimum, and what is the minimum average cost per oven (to the nearest cent)? HINT: Refer to the sketch in part (ii) and evaluate $\overline{C}(x)$ at appropriate integer values until a minimum value is found. 130) _____



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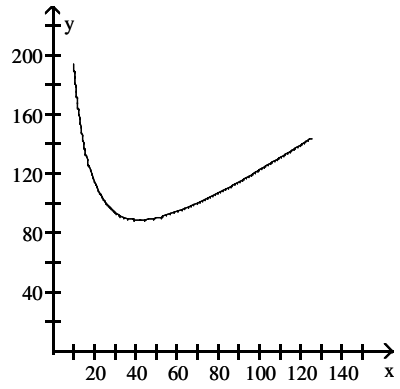
A) (i) $\overline{C}(x) = \dfrac{x^2 + 4x + 1800}{x}$

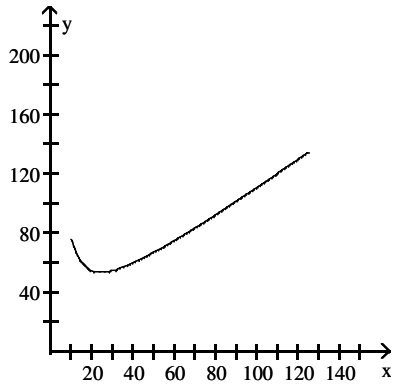
(ii)



(iii) 42 units; \$88.86 per oven

B) (i) $\overline{C}(x) = \dfrac{x^2 + 4x + 1800}{x}$

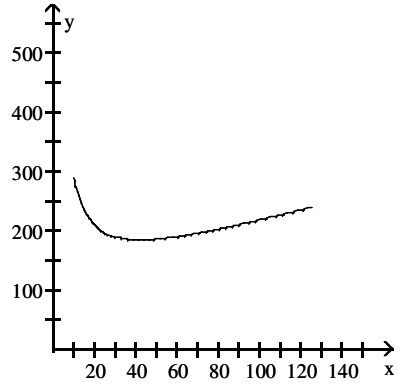
(ii)



(iii) 22 units; \$48.93 per oven

C) (i) $\overline{C}(x) = \dfrac{x^2 + 4x + 1800}{x}$

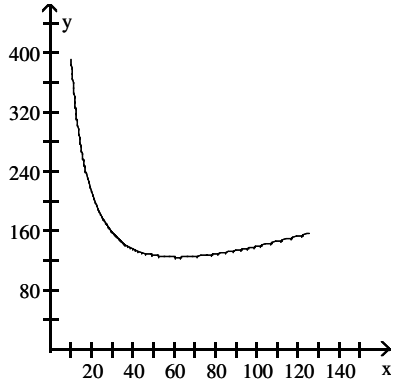
(ii)



(iii) 44 units; \$185.61 per oven

D) (i) $\overline{C}(x) = \dfrac{x^2 + 4x + 1800}{x}$

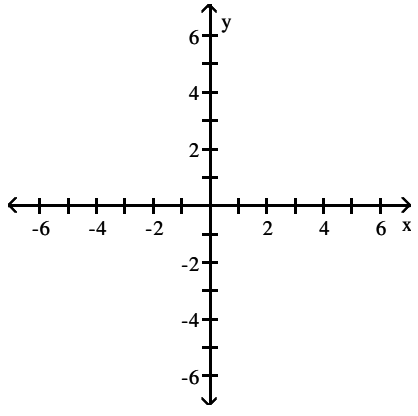
(ii)



(iii) 61 units; \$133.29 per oven

Graph the function.

131) $f(x) = \left(\dfrac{1}{3}\right)^x$ 131) _____



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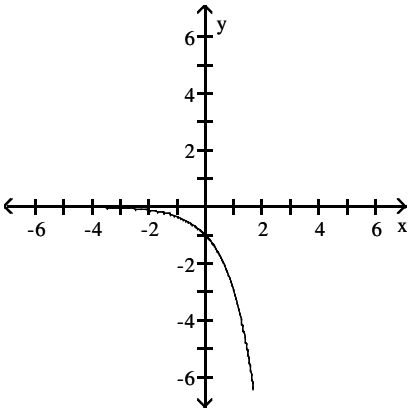
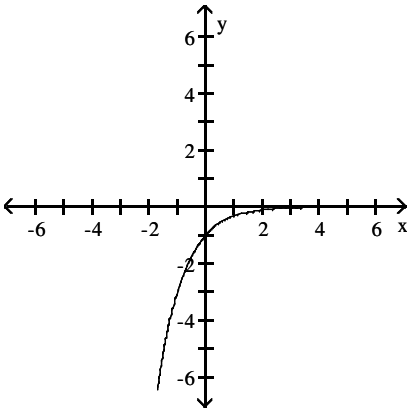
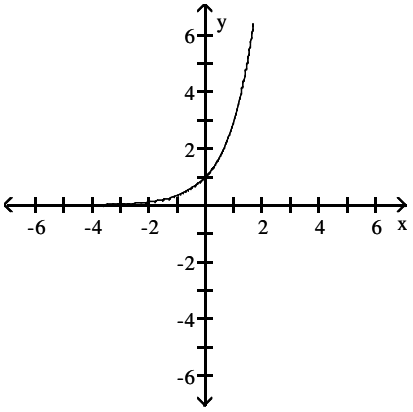
A)



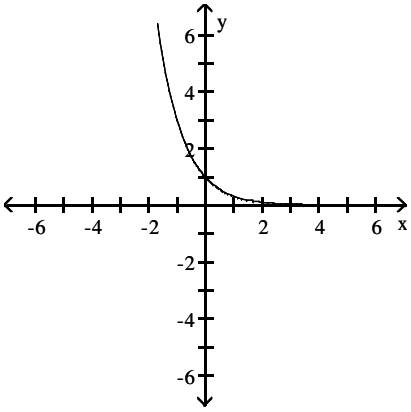
B)



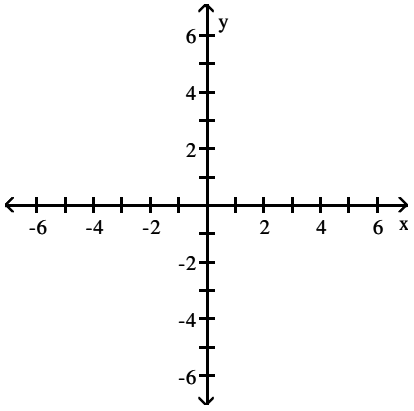
C)



D)



132) $f(x) = 4^{(x + 1)} + 2$ 132) _____



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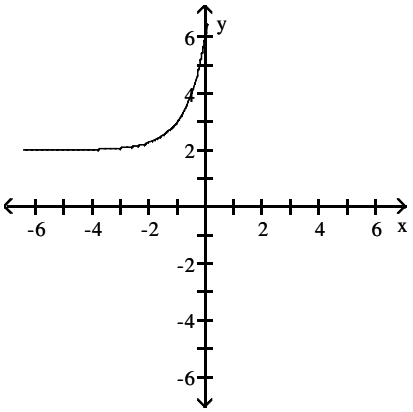
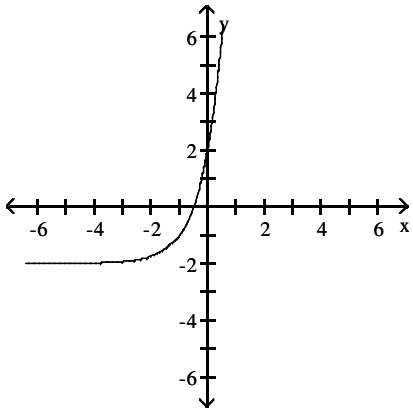
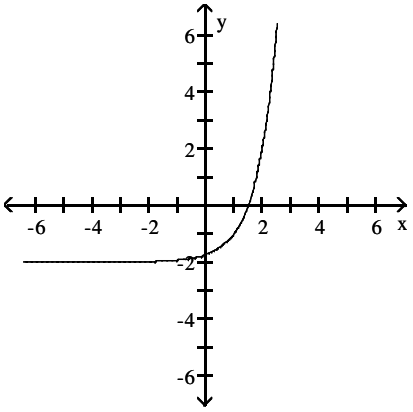
A)



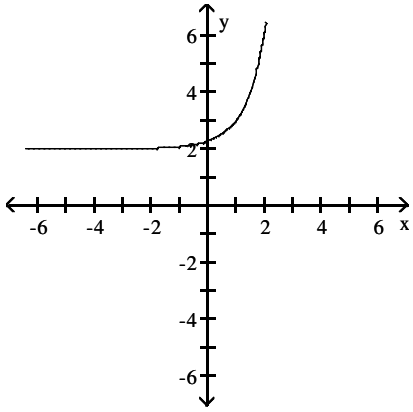
B)



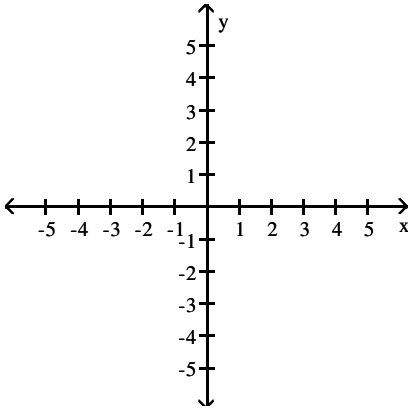
C)



D)



133) $f(x) = 2^{-x} - 3$ 133) _____



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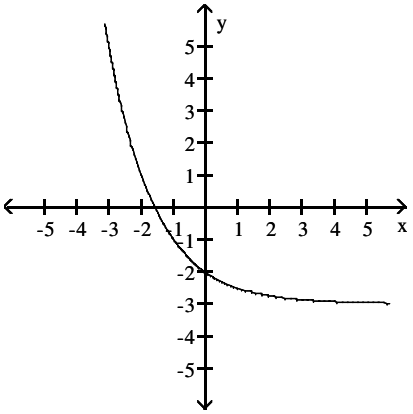
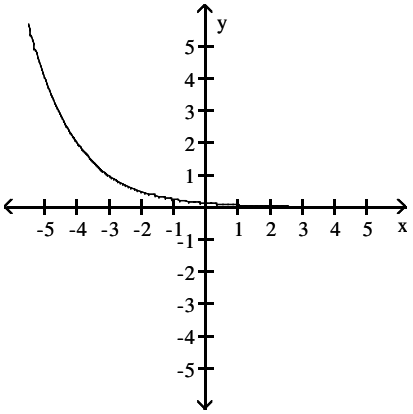
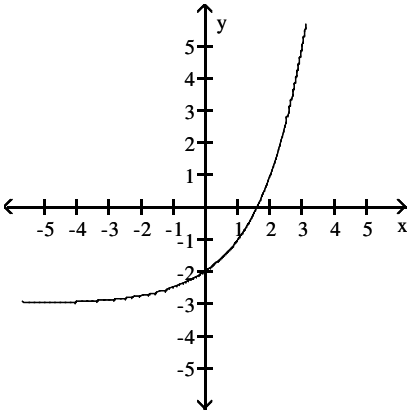
A)



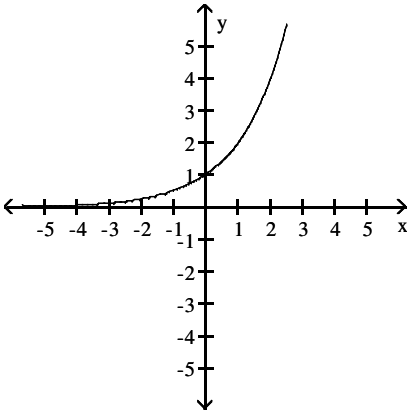
B)



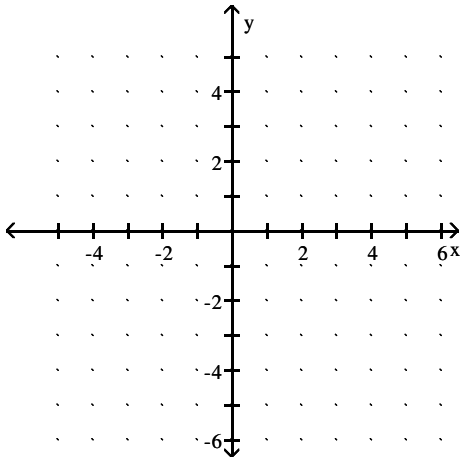
C)



D)



134) $f(x) = 0.2^x$ 134) _____



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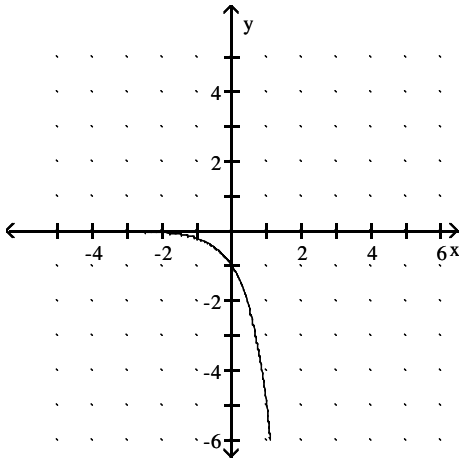
A)



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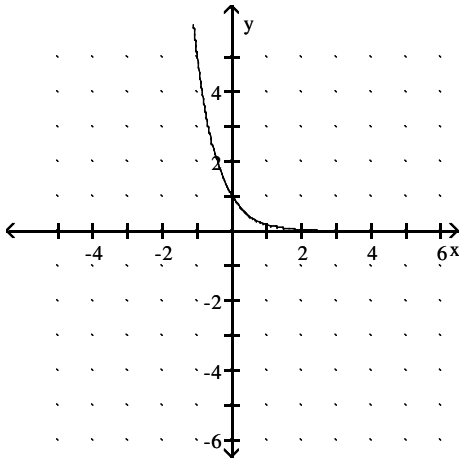

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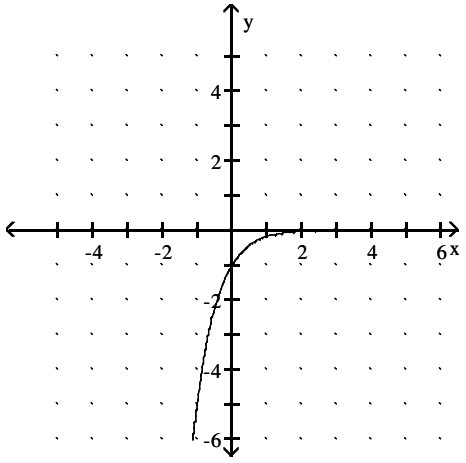

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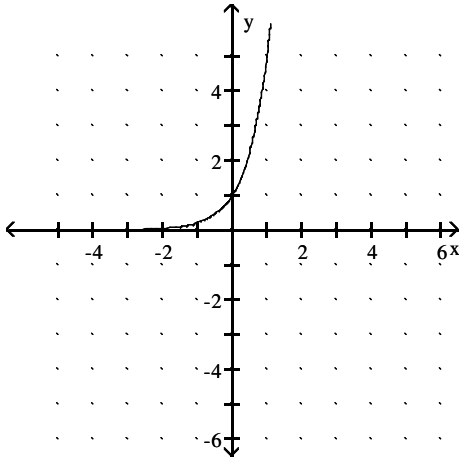
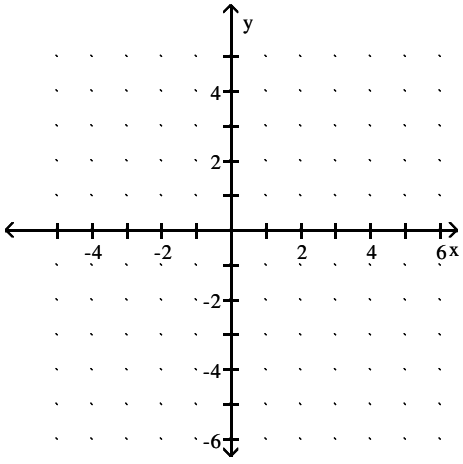


135) $f(x) = 4^x$

135) _____



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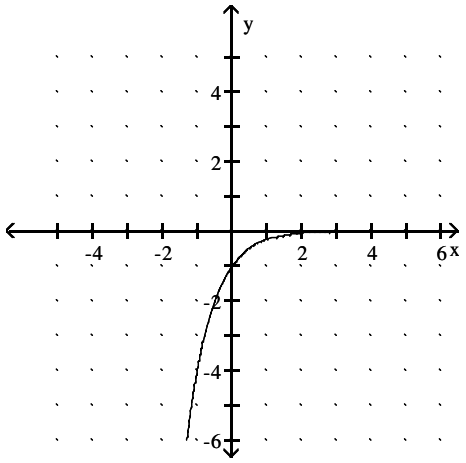
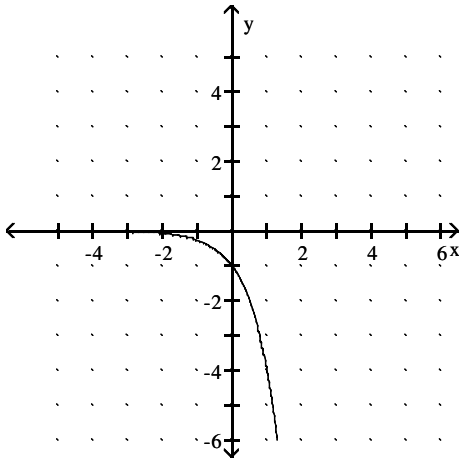
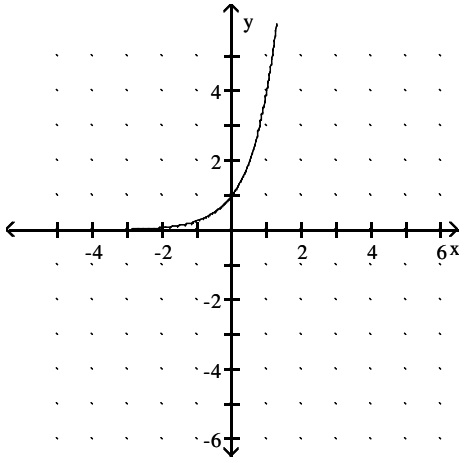
A)



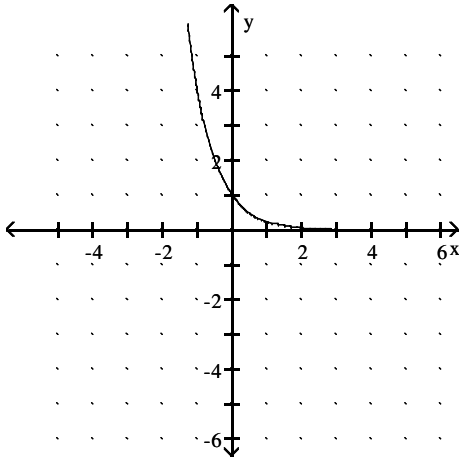
B)



C)



D)



Solve the equation.

136) Solve for x: $3^{(1 + 2x)} = 27$ 136) _____

A) 3 B) 9 C) –1 D) 1

137) Solve for x: $2^{4x} = 8^{x + 5}$ 137) _____

A) 5 B) –5 C) –15 D) 15

138) Solve for x: $(e^x)^x \cdot e^{20} = e^{9x}$ 138) _____

A) {5, 4} B) {4} C) {5} D) {–5, –4}

139) Solve for t: $e^{-0.07t} = 0.05$ Round your answer to four decimal places. 139) _____

A) 44.321 B) 42.7962 C) –70.1312 D) –66.4815

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SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Solve the problem.

140) In the table below, the amount of the U.S. minimum wage is listed for selected years. 140) _____

U.S. Minimum Wage

Year	1961	1967	1974	1980	1981	1990	1991	1996	1997
Wage	$1.15	$1.40	$2.00	$3.10	$3.35	$3.80	$4.25	$4.75	$5.15

Find an exponential regression model of the form $y = a \cdot b^x$, where y represents the U.S. minimum wage x years after 1960. Round a and b to four decimal places. According to this model, what will the minimum wage be in 2005? In 2010?

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

141) Hi–Tech UnWater begins a cable TV advertising campaign in Miami to market a new water. The percentage of the target market that buys water is estimated by the function $w(t) = 100(1 - e^{-0.02t})$, t represents the number of days of the campaign. After how long will 90% of the target market have bought the water? 141) _____

A) 3 days B) 120 days C) 115 days D) 90 days

142) The number of books in a community college library increases according to the function $B = 7200e^{0.03t}$, where t is measured in years. How many books will the library have after 8 year(s)? 142) _____

A) 9153 B) 7200 C) 10,275 D) 4462

143) Since life expectancy has increased in the last century, the number of Alzheimer's patients has increased dramatically. The number of patients in the United States reached 4 million in 2000. Using data collected since 2000, it has been found that the data can be modeled by the exponential function $y = 4.19549 \cdot (1.02531)^x$, where x is the years since 2000. Estimate the Alzheimer's patients in 2025. Round to the nearest tenth. 143) _____

A) 3.9 million B) 8.0 million C) 7.8 million D) 4.8 million

144) A sample of 800 grams of radioactive substance decays according to the function $A(t) = 800e^{-0.028t}$, where t is the time in years. How much of the substance will be left in the sample after 10 years? Round to the nearest whole gram. 144) _____

A) 605 grams B) 800 grams C) 1 gram D) 9 grams

145) The number of reports of a certain virus has increased exponentially since 1960. The current number of cases can be approximated using the function $r(t) = 207\ e^{0.005t}$, where t is the number of years since 1960. Estimate the of cases in the year 2010. 145) _____

A) 207 B) 240 C) 190 D) 266

146) An initial investment of $12,000 is invested for 2 years in an account that earns 4% interest, compounded quarterly. Find the amount of money in the account at the end of the period. 146) _____

A) $994.28 B) $12,865.62 C) $12,979.20 D) $12,994.28

147) Suppose that $2200 is invested at 3% interest, compounded semiannually. Find the function for the amount of money after t years. 147) _____

A) $A = 2200\ (1.015)^{2t}$ B) $A = 2200\ (1.015)^t$

C) $A = 2200\ (1.03)^{2t}$ D) $A = 2200\ (1.0125)^{2t}$

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Use the REGRESSION feature on a graphing calculator.

148) A strain of E–coli Beu–recA441 is placed into a petri dish at 30°Celsius and allowed to grow. The following data are collected. Theory states that the number of bacteria in the petri dish will initially g according to the law of uninhibited growth. The population is measured using an optical device in w the amount of light that passes through the petri dish is measured. 148) _____

Time in hours , x	Population, y
0	0.09
2.5	0.18
3.5	0.26
4.5	0.35
6	0.50

Find the exponential equation in the form $y = a \cdot b^x$, where x is the hours of growth. Round to four decimal places.

A) $y = 0.0903^x$
B) $y = 1.3384 \cdot 0.0903^x$
C) $y = 1.3384^x$
D) $y = 0.0903 \cdot 1.3384^x$

149) The total cost of the Democratic and the Republican national conventions has increased 596% over the 20–year period between 1980 and 2004. The following table lists the total cost, in millions of dolla selected years. 149) _____

Year, x	Cost, y
1980, x = 0	$ 23.1
1984, x = 4	31.8
1988, x = 8	44.4
1992, x = 12	58.8
1996, x = 16	90.6
2000, x = 20	160.8
2004, x = 24	170.5

Find the exponential functions that best estimates this data. Round your answer to four decimal plac

A) $y = 6.6643x + 2.8857$
B) $y = 22.2887x \cdot (1.0929)^x$
C) $y = 22.2887 \cdot (1.0929)^x$
D) $y = 1.0929 \cdot (22.2887)^x$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

150) A particular bacterium is found to have a doubling time of 20 minutes. If a laboratory culture begins with a population of 300 of this bacteria and there is no change in the growth rate, how many bacteria will be present in 55 minutes? Use six decimal places in the interim calculation for the growth rate. 150) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Convert to a logarithmic equation.

151) $2^3 = 8$ 151) _____

A) $\log_2 3 = 8$
B) $\log_3 8 = 2$
C) $\log_2 8 = 3$
D) $\log_8 2 = 3$

152) $5^2 = 25$ 152) _____

A) $2 = \log_5 25$
B) $2 = \log_{25} 5$
C) $25 = \log_5 2$
D) $5 = \log_2 25$

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153) $10^{0.4771} = 3$ 153) _____

A) $0.4771 = \log 3$ B) $0.4771 = \log 10$

C) $3 = \log 0.4771$ D) $0.4771 = \log_9 10$

154) $e^t = 7$ 154) _____

A) $\ln t = 7$ B) $\log_7 e = t$ C) $\log_7 t = e$ D) $\ln 7 = t$

Convert to an exponential equation.

155) $\log_9 27 = \frac{3}{2}$ 155) _____

A) $\frac{3}{2} = \sqrt[9]{27}$ B) $27 = 9^{3/2}$ C) $27 = \left(\frac{3}{2}\right)^9$ D) $9 = 27^{3/2}$

156) $\log_8 512 = t$ 156) _____

A) $8^t = 512$ B) $512^8 = t$ C) $t^8 = 512$ D) $8^{512} = t$

157) $\ln 44 = 3.7842$ 157) _____

A) $e^{3.7842} = 44$ B) $e^{3.7842} = 1$ C) $e^{44} = 3.7842$ D) $e^{3.7842} = \ln 44$

Evaluate.

158) $\log_8 8^4$ 158) _____

A) 32 B) 8 C) 4 D) 8^4

Use a calculator to evaluate the expression. Round the result to five decimal places.

159) $\log 0.17$ 159) _____

A) −4.07454 B) −1.76955 C) −0.76955 D) −1.77196

160) $\log 0.234$ 160) _____

A) −1.45243 B) −0.63074 C) 1.26364 D) 0.234

161) $\log 51.237$ 161) _____

A) 1.70958 B) 51.237 C) 3.93646 D) Undefined

162) $\log (-10.25)$ 162) _____

A) 1.01072 B) 2.32728 C) −1.01072 D) Undefined

163) $\log_8 36.8$ 163) _____

A) 1.73388 B) 0.57674 C) 3.60550 D) 1.56585

164) $\ln 0.027$ 164) _____

A) −1.56864 B) −3.61192 C) 0.56864 D) Undefined

165) $\ln 1097$ 165) _____

A) 3.04021 B) 4.69775 C) 9.30292 D) 7.00033

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Write in terms of simpler forms.

166) $\log_4 XY$ 166) _____

A) $\log_2 X + \log_2 Y$ B) $\log_4 X + \log_4 Y$ C) $\log_2 X - \log_2 Y$ D) $\log_4 X - \log_4 Y$

167) $\log_b \frac{b}{y}$ 167) _____

A) $\log_b b - \log_b y$ B) $\log_b b - y$ C) $\log_b b + \log_b y$ D) $\log_{2b} \frac{b}{y}$

168) $\log_b M^9$ 168) _____

A) $M + \log_b 9$ B) $M \log_b 9$ C) $9 \log_b M$ D) $9 + \log_b M$

169) $4^{a \log_4 b}$ 169) _____

A) b^a B) a^b C) b^{4a} D) a^{4b}

Solve for x to two decimal places (using a calculator).

170) $700 = 500(1.04)^x$ 170) _____

A) 520 B) 1.40 C) 1.35 D) 8.58

171) $5.2 = 1.006^{12x}$ 171) _____

A) 22.97 B) 5.17 C) 1.07 D) 2.32

Use the properties of logarithms to solve.

172) $\log_7 x + \log_7(x - 2) = \log_7 24$ 172) _____

A) 6 B) 24 C) 2 D) 7

173) $\log_b x - \log_b 5 = \log_b 2 - \log_b(x - 3)$ 173) _____

A) 5 B) 3 C) 2, 5 D) 2

174) $\log_b(x + 3) + \log_b x = \log_b 54$ 174) _____

A) 3 B) –6 C) 6 D) –6, –3

175) $\log_6 (4x - 5) = 1$ 175) _____

A) $\frac{11}{6}$ B) $\frac{\log 5}{4}$ C) 7 D) $\frac{11}{4}$

176) $\ln (3x - 4) = \ln 20 - \ln (x - 5)$ 176) _____

A) $-5, -\frac{19}{3}$ B) $0, \frac{19}{3}$ C) $\frac{19}{3}$ D) $5, \frac{5}{3}$

177) $\log (x + 10) - \log (x + 4) = \log x$ 177) _____

A) 2, – 5 B) 6 C) –5 D) 2

178) $\log (x - 9) = 1 - \log x$ 178) _____

A) –1, 10 B) –10 C) –10, 1 D) 10

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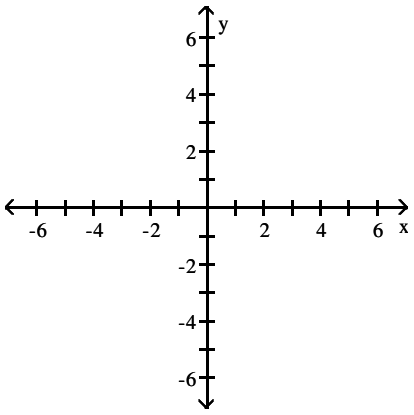
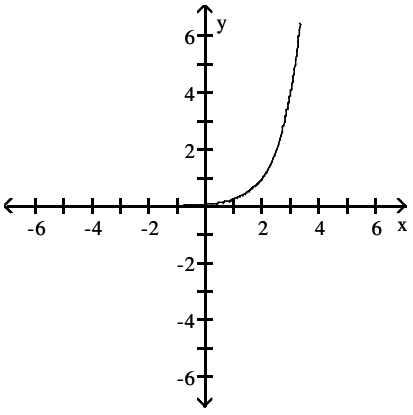
Graph by converting to exponential form first.

179) $y = \log_4 (x - 2)$ 179) _____



A)



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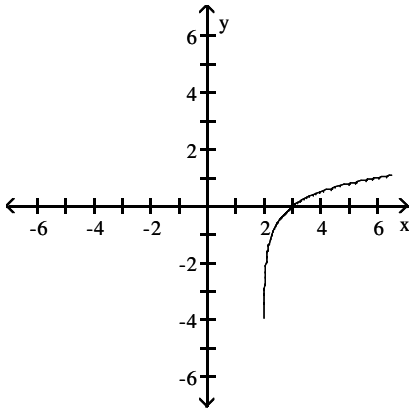

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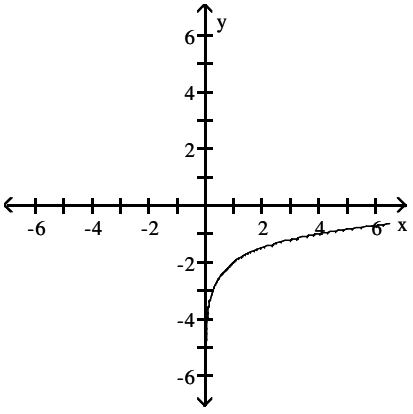
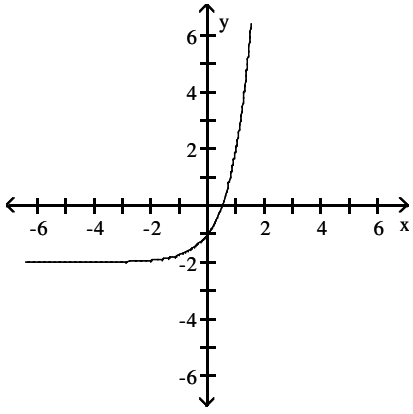


D)



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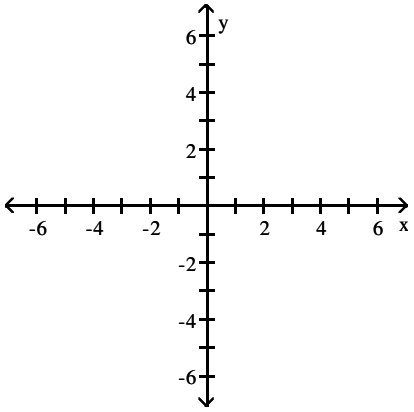
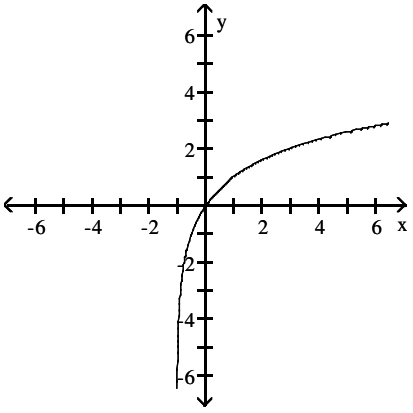
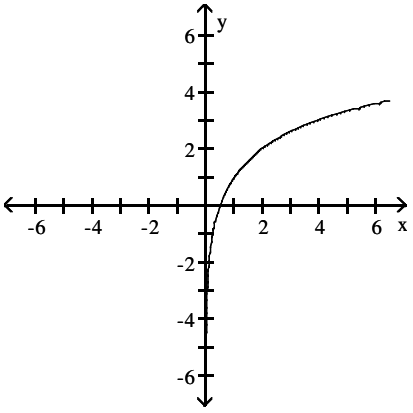
180) $y = \log_2 (x + 1)$ 180) _____



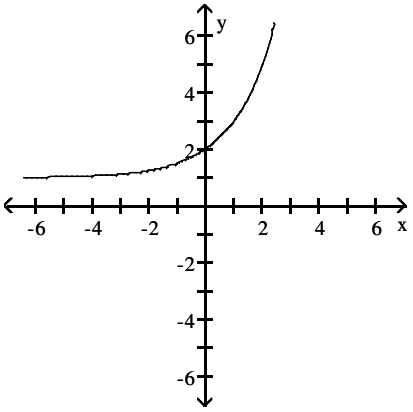
A)



B)



C)



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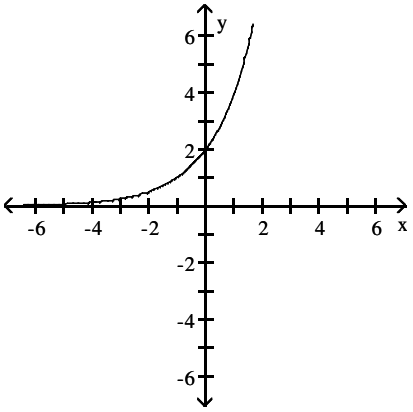

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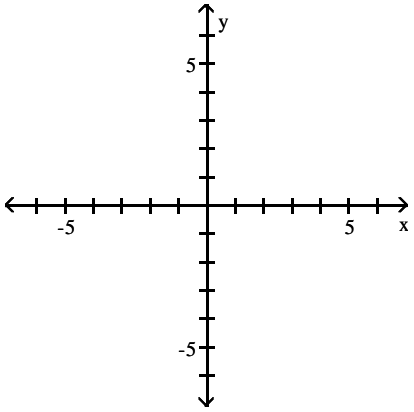
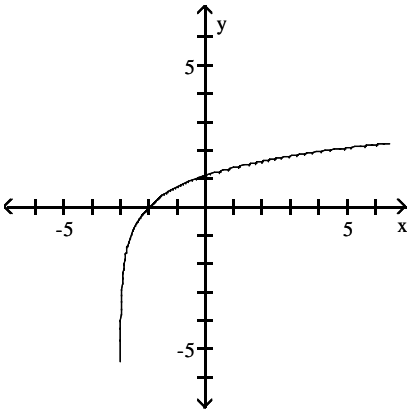
Graph the function using a calculator and point–by–point plotting. Indicate increasing and decreasing intervals.

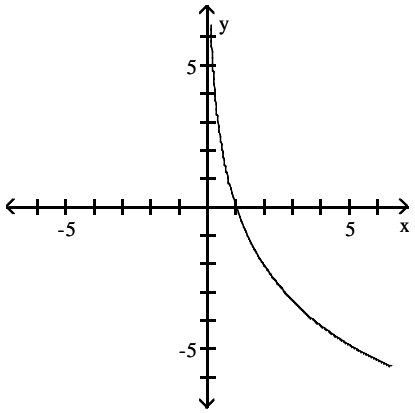
181) $f(x) = 3 \ln x$ 181) _____



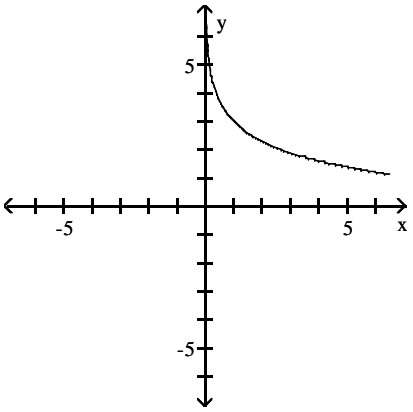
A) Increasing: (–3, ∞)



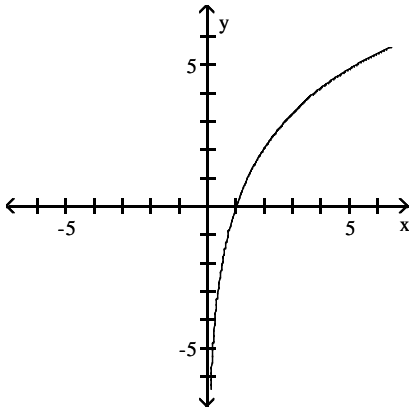
B) Decreasing: (0, ∞)



C) Decreasing: (0, ∞)



D) Increasing: (0, ∞)



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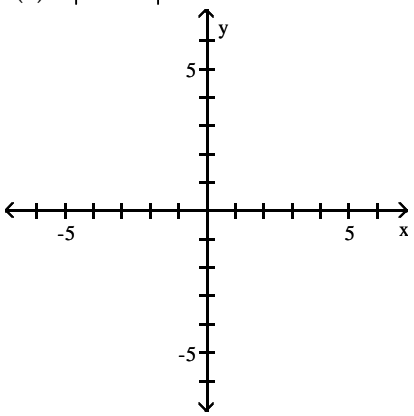
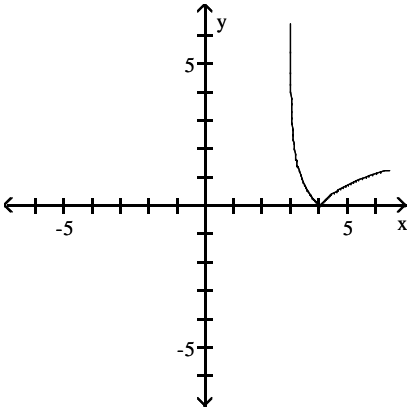
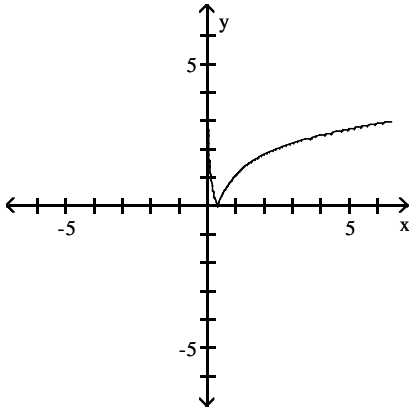
182) $f(x) = |-3 \ln x|$ 182) _____



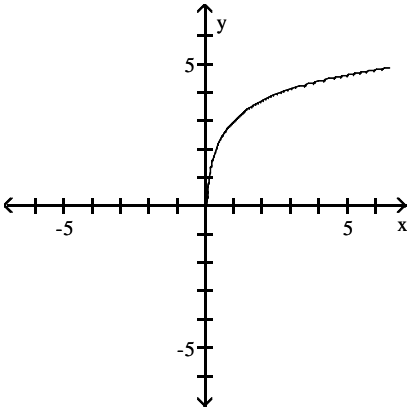
A) Decreasing: (0, –3]
Increasing: [–3, ∞)



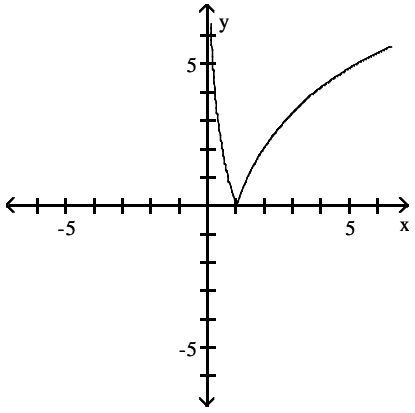
B) Decreasing: $\left(0, \frac{1}{2}\right]$
Increasing: $\left[\frac{1}{2}, \infty\right)$



C) Decreasing: (0, ∞)



D) Decreasing: (0, 1]
Increasing: [1, ∞)



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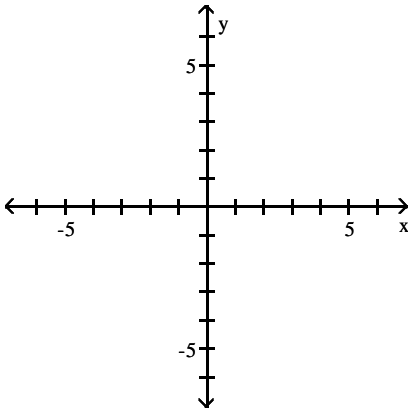
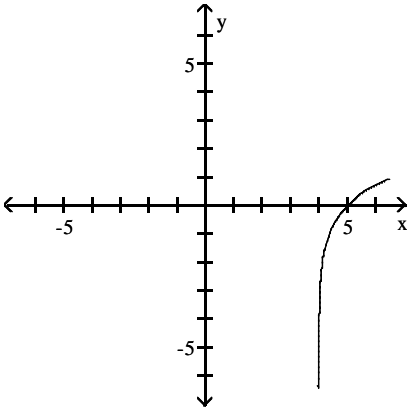
183) f(x) = –4 – ln x

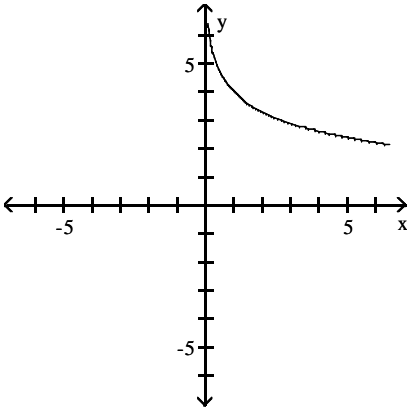
183) _____



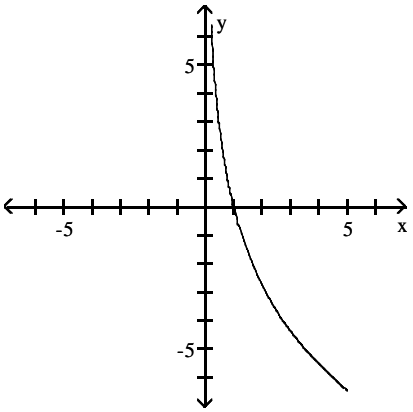
A) Increasing (–4, ∞)



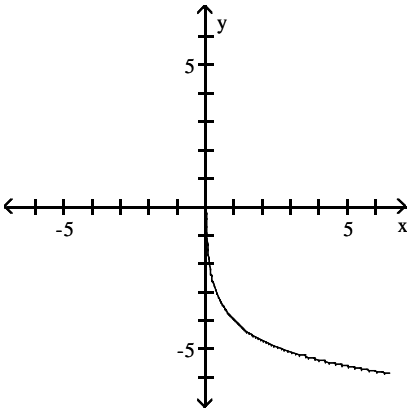
B) Decreasing: (0, ∞)



C) Increasing (0, ∞)



D) Decreasing: (0, ∞)



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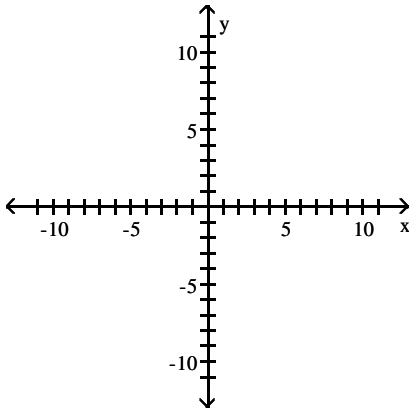
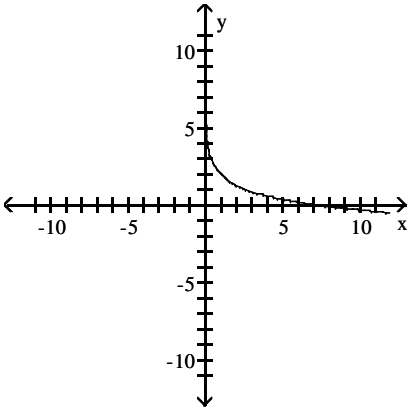
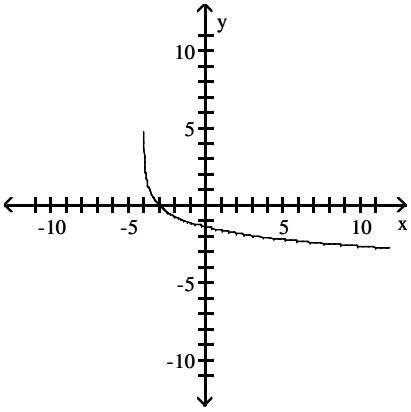
184) $f(x) = 2 - \ln(x + 4)$ 184) _____



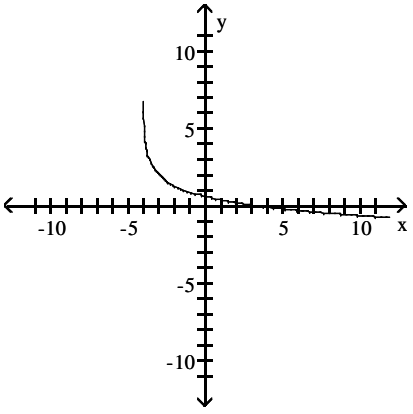
A) Decreasing: (0, ∞)



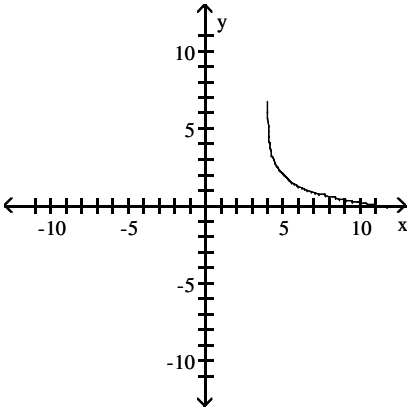
B) Decreasing: (–4, ∞)



C) Decreasing: (–4, ∞)



D) Decreasing: (4, ∞)



Solve the problem.

185) If \$1250 is invested at a rate of $8\frac{1}{4}$% compounded monthly, what is the balance after 10 years? 185) _____

$[A = P(1 + i)^n]$

A) \$1594.31 B) \$2281.25 C) \$2844.31 D) \$1031.25

186) If \$4,000 is invested at 7% compounded annually, how long will it take for it to grow to \$6,000, assu 186) _____
no withdrawals are made? Compute answer to the next higher year if not exact.

$[A = P(1 + r)^t]$

A) 8 years B) 2 years C) 5 years D) 6 years

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187) In North America, coyotes are one of the few species with an expanding range. The future population of coyotes in a region of Mississippi valley can be modeled by the equation $P = 59 + 12 \cdot \ln(18t + 1)$, where t is time in years. Use the equation to determine when the population will reach 170. (Round your answer to the nearest tenth year.) 187) _____

A) 581.3 years B) 578.0 years C) 583.1 years D) 586.2 years

188) A country has a population growth rate of 2.4% compounded continuously. At this rate, how long will it take for the population of the country to double? Round your answer to the nearest tenth. 188) _____

A) 28.9 years B) .29 years C) 30 years D) 2.9 years

189) A carbon–14 dating test is performed on a fossil bone, and analysis finds that 15.5% of the original amount of carbon–14 is still present in the bone. Estimate the age of the fossil bone. (Recall that carbon–14 decays according to the equation $A = A_0e^{-0.000124t}$). 189) _____

A) 15,035 years B) 150 years C) 1,500 years D) 15, 000 years

190) Assume that a savings account earns interest at the rate of 2% compounded monthly. If this account contains $1000 now, how many months will it take for this amount to double if no withdrawals are made? 190) _____

A) 450 months B) 408 months C) 12 months D) 417 months

191) U. S. Census Bureau data shows that the number of families in the United States (in millions) in year x is given by $h(x) = 51.42 + 15.473 \cdot \log x$, where $x = 0$ is 1980. How many families were there in 2002? 191) _____

A) 48 million B) 21 million C) 90 million D) 72 million

192) The level of a sound in decibels (db) is determined by the formula $N = 10 \cdot \log(I \times 10^{12})$ db, where I is the intensity of the sound in watts per square meter. A certain noise has an intensity of 8.49×10^{-4} watts per square meter. What is the sound level of this noise? (Round your answer to the nearest decibel.) 192) _____

A) 9 db B) 79 db C) 89 db D) 206 db

193) Book sales on the Internet (in billions of dollars) in year x are approximated by $f(x) = 1.84 + 2.1 \cdot \ln x$, where $x = 0$ corresponds to 2000. How much will be spent on Internet book sales in 2008? Round to the nearest tenth. 193) _____

A) 6.0 billion B) 3.9 billion C) 6.2 billion D) 8.0 billion

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1) A
2) D
3) B
4) A
5) B
6) B
7) C
8) C
9) A
10) A
11) C
12) B
13) B
14) A
15) C
16) C
17) D
18) A
19) $-27, -12, -\frac{33}{2}$
20) 53
21) –5
22) B
23) D
24) B
25) C
26) D
27) $f(x) = \frac{2x}{48 - x}$ has domain all real numbers except $x = 48$.
28) B
29) A
30) A
31) A
32) B
33) B
34) A
35) A
36) B
37) A
38) B
39) A
40) B
41) Choice (A) defines a function. To each element (student) of the first set (or domain), there corresponds exactly one eleme
(teacher) of the second set (or range).
Choice (B) does not define a function. An element (student) of the first set (or domain) corresponds to more that one ele
(teacher) of the second set (or range).
42) C
43) D
44) D

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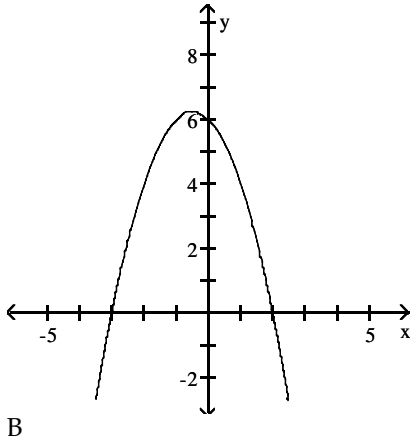
45) B
46) A
47) A
48) D
49) C
50) D
51) Basic function is $f(x) = x^2$; shift right 2 units, shift up 5 units. $f(x) = (x - 2)^2 + 5$
52) Basic function is $f(x) = |x|$; reflect over the x –axis, shift left 4 units, shift down 2 units. $f(x) = -|x + 4| - 2$
53) D
54) A
55) C
56) $g(x) = \begin{cases} x - 9 & x < 7 \\ (x - 5)^2 - 1 & x \geq 7 \end{cases}$
57) B
58) B
59) B
60) D
61) B
62) A
63) C
64) A
65) D
66) B
67) C
68) C
69) A
70) A
71) A
72) C
73) B
74) $f(x) = -(x + 2)^2 + 9$; vertex: (–2, 9); maximum: f(–2) = 9; Range of f = {y| y ≤ 9} ; y–intercept: (0, 5); x–intercepts: (–5, 0), (1, 0).
75) Max $f(x) = \frac{25}{4}$



76) B
77) A
78) A

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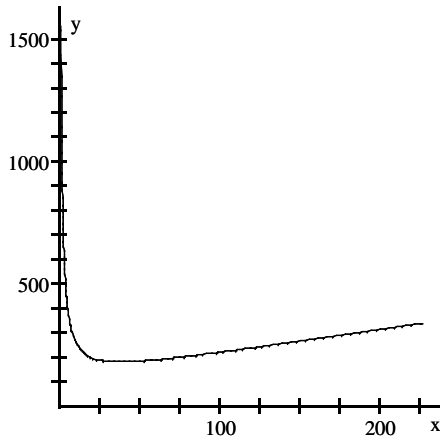
79) C
80) B
81) B
82) A
83) B
84) D
85) D
86) A
87) B
88) A
89) A
90) B
91) A
92) D
93) B
94) D
95) C
96) C
97) $P(x) = -6x^2 + 80.3x - 150$, must sell approximately 6.69 million cameras.
98) (A) $\overline{C}(x) = \frac{1500}{x} + 105 + x$

(B)



(C) 39; $182.46
99) C
100) B
101) C
102) C
103) A
104) C
105) D
106) B
107) B
108) D
109) A
110) C
111) A

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112) B
113) C
114) B
115) A
116) D
117) C
118) D
119) A
120) C
121) B
122) A
123) B
124) C
125) A
126) D
127) A
128) A
129) A
130) A
131) D
132) A
133) A
134) B
135) C
136) D
137) D
138) A
139) B
140) $y = 1.1389(1.0429^x)$; \$7.54; \$9.30
141) C
142) A
143) C
144) A
145) D
146) D
147) A
148) D
149) C
150) 2,018 bacteria
151) C
152) A
153) A
154) A
155) B
156) A
157) A
158) C
159) C
160) B
161) A

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162) D
163) A
164) B
165) D
166) B
167) A
168) C
169) A
170) D
171) A
172) A
173) A
174) C
175) D
176) C
177) D
178) D
179) B
180) A
181) D
182) D
183) D
184) C
185) C
186) D
187) B
188) A
189) A
190) D
191) D
192) C
193) C

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