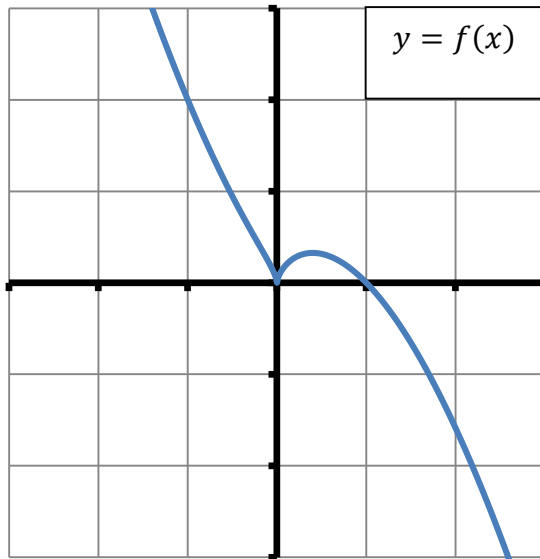


For each problem given below,
the [answer](#) is listed at the end of
this document, and the
corresponding lesson number is
listed next to the problem. You
can review the [video lessons and](#)
PowerPoint presentations on the
[MA 15300 website](#).

1. Which of the following statements is/are true regarding the graph of the function f given below? (*Lessons 21, 29, 34*)



- A. $f(x) > 0$ when $x < 1$
 B. f is decreasing throughout its domain
 C. f is a one-to-one function
 D. More than one of the above
 E. None of the above

2. The base of a triangle is three inches more than its height. If each is increased by 3 inches the area is 14 square inches. Find the original base (b) and the original height (h) in inches. (*Lesson 12*)

- A. $b = 4, h = 1$
 B. $b = 9, h = 6$
 C. $b = 8, h = 5$
 D. $b = \frac{7}{2}, h = \frac{1}{2}$
 E. None of the above

3. Simplify $\frac{(25x^4y^{16}z^9)^{-\frac{1}{2}}}{x^{-5}y\sqrt{z}}$. (*Lesson 2*)

- A. $\frac{x^3}{5y^9z^5}$
 B. $\frac{5x^7y^3z^2}{2}$
 C. $\frac{2}{5x^7y^7z^4}$
 D. $\frac{x^7}{5y^7z^4}$
 E. None of the above

4. Subtract and simplify. (*Lesson 5*)

$$\frac{3x}{3x+1} - \frac{x}{x-2}$$

- A. $\frac{2x^2-1}{(3x+1)(x-2)}$
B. $\frac{-3x^2}{(3x+1)(x-2)}$
C. $\frac{-7x}{(3x+1)(x-2)}$
D. $\frac{2x}{(3x+1)(x-2)}$
E. None of the above

5. Simplify **COMPLETELY**. (*Lesson 6*)

$$\frac{1 - \frac{a}{b}}{\frac{a^2}{b^2} - 1}$$

- A. $\frac{ab-b^2}{a^2-b^2}$
B. $\frac{b}{b+a}$
C. $\frac{b}{a}$
D. $-\frac{b}{a+b}$
E. None of the above

6. If the point $P(-6, 12)$ is on the graph of the function $y = f(x)$, which of the following is the corresponding point on the graph of the function $y = -2f(3x) + 4$. (*Lesson 22*)

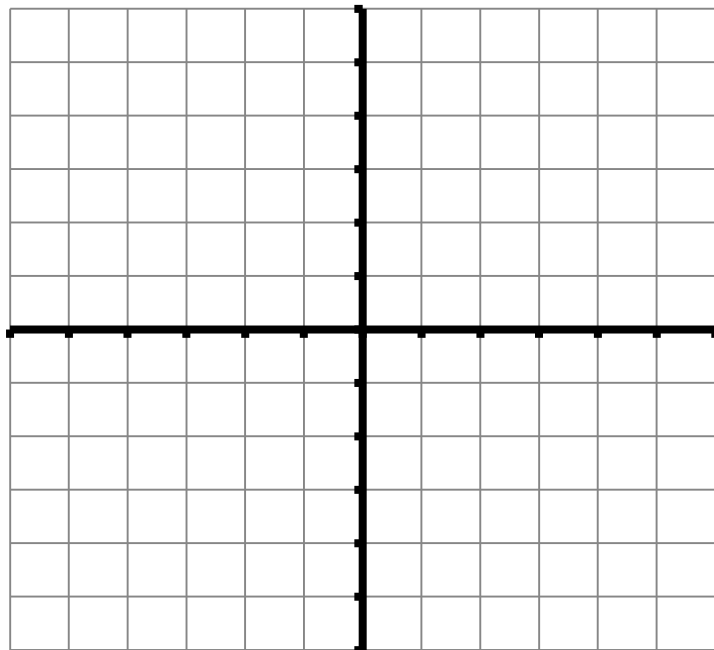
- A. $(-18, -20)$
B. $(-2, -10)$
C. $(-18, -2)$
D. $(-2, -20)$
E. $(-18, -10)$

7. Express $f(x) = -2x^2 + 12x - 14$ in the form $y = a(x - h)^2 + k$. (Lesson 25)

- A. $y = -2(x + 3)^2 + 4$
- B. $y = -2(x + 3)^2 + 32$
- C. $y = -2(x - 3)^2 + 32$
- D. $y = -2(x - 3)^2 + 4$
- E. $y = -2(x - 6)^2 - 14$

8. Which of the following statements is/are true about the function $f(x) = 2^{-x}$? (Lesson 35)
(hint: it may help to graph the function first)

- | | |
|------|---|
| I. | The domain of $f(x)$ is $(-\infty, \infty)$ |
| II. | The range of $f(x)$ is $(-\infty, \infty)$ |
| III. | $f(x) \neq 0$ |



- A. I only
- B. II only
- C. I and III only
- D. II and III only
- E. I, II, and III are all true

9. A woman rows a boat 1.75 miles upstream against a constant current in 35 minutes. She then rows the same distance downstream (with the same current) in 15 minutes. What is the rate of the current? (*Lesson 8 or Lesson 33*)

A. 2 mph
B. 5 mph
C. $\frac{1}{30}$ mph
D. 1 mph
E. $\frac{17}{60}$ mph

10. A job takes 45 minutes for two people working together. If one person works alone he can do the job in 2 hours. How long will it take the other person working alone to complete the job? (*Lesson 9*)

A. $\frac{90}{43}$ hours
B. 1 hour and 15 minutes
C. 43 minutes
D. 1 hour
E. 1 hour and 12 minutes

11. Which of the following statements is/are true? (*Lessons 14 and 15*)

- | | |
|------|-----------------------------------|
| I. | $ x - 2 = -2$, when $x = 0, 4$ |
| II. | $ x - 2 > 2$, when $0 < x < 4$ |
| III. | $ x - 2 < 0$, when $-2 < x < 2$ |

A. I only
B. II only
C. III only
D. I, II, and III are all true
E. I, II, and III are all false

12. Rationalizing the denominators and simplify. (*Lesson 2*)

$$\sqrt{\frac{1}{18x^3y^4}}$$

A. $\frac{1}{6x^2y^2}$

B. $\frac{\sqrt{2x}}{6x^2y^2}$

C. $\frac{1}{9x^{\frac{3}{2}}y^2}$

D. $\frac{\sqrt{2x}}{12x^3y^2}$

E. $\frac{1}{3xy^2}$

13. Let x and y be two consecutive positive integers such that x is less than y and the difference of their squares is 145. Find x . (hint: set-up a system of equations) (*Lesson 8 or Lesson 33*)

A. 73

B. 72

C. 12

D. 8

E. None of the above

14. Given the formula $f = \frac{1}{\frac{1}{a} + \frac{1}{b}}$, solve for b . (*Lesson 7*)

A. $b = \frac{af}{a+f}$

B. $b = \frac{1}{2}$

C. $b = \frac{f}{a}$

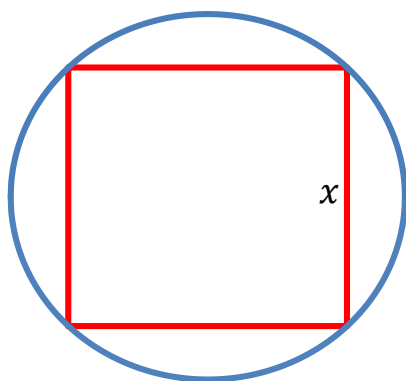
D. $b = \frac{a}{af-1}$

E. $b = \frac{af}{a-f}$

15. Which of the following is equivalent to $\log\left(\frac{z^3}{x\sqrt{y}}\right)$? (*Lesson 38*)

- A. $3 \log z - \log x - \frac{1}{2} \log y$
- B. $\frac{3}{2} \log(z - xy)$
- C. $3 \log z - \log x - 2 \log y$
- D. $\frac{3}{2} \log(z - x + y)$
- E. $3 \log z - \log x + \frac{1}{2} \log y$

16. A square of side x is inscribed in a circle. Express the area A of the circle as a function of x . (*Lesson 21*)



- A. $A(x) = \frac{\pi}{2} x^2$
- B. $A(x) = x^2$
- C. $A(x) = \pi x^2$
- D. $A(x) = \frac{\pi}{4} x^2$
- E. None of the above

17. If $f(x) = \sqrt{2 - 3x}$ and $g(x) = \frac{1}{x^2}$, which of the following statements is/are true? (*Lessons 20, 34, 27*)

- | |
|---|
| <ul style="list-style-type: none"> I. The domain of f is $[0, \infty)$ II. $g(x)$ is a one-to-one function III. $(g \circ f)(0) = \frac{1}{2}$ |
|---|

- A. I only
- B. III only
- C. I and III only
- D. II and III only
- E. I, II, and III are all true

18. How many ml of a 50% acid solution should be added to 40 ml of a 20% acid solution to obtain a solution that is 25% acid? (*Lesson 8 or Lesson 33*)

- A. 10 ml
- B. 8 ml
- C. 6 ml
- D. 4 ml
- E. None of the above

19. Solve for x . Choose the answer that best describes the solution(s). (*Lesson 14*)

$$x + \sqrt{5x + 19} = -1$$

- A. There are two solutions.
One is positive and one is negative.
- B. There are two solutions.
Both are positive.
- C. There are two solutions.
Both are negative.
- D. There is one solution.
It is positive.
- E. There is one solution.
It is negative.

20. Find the domain of f . (*Lesson 20*)

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

- A. $(-\infty, \infty)$
- B. $\left[\frac{3}{2}, \infty\right)$
- C. $\left[\frac{2}{3}, \infty\right)$
- D. $\left(-\infty, \frac{2}{3}\right]$
- E. $[0, \infty)$

21. Which of the following equations is/are true? (*Lesson 36*)

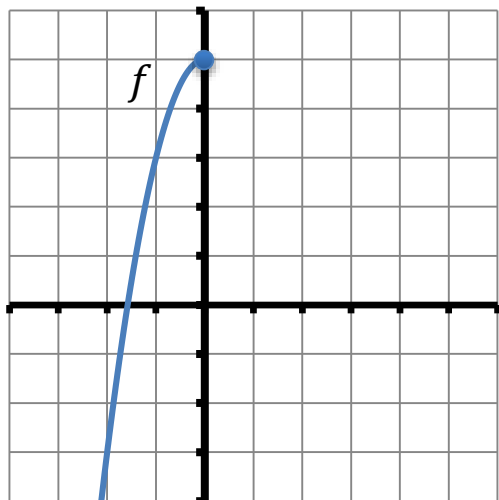
- | | |
|------|-------------------|
| I. | $\ln 0 = 1$ |
| II. | $10^{\log 8} = 8$ |
| III. | $\log_4 8 = 2$ |

- A. I only
 B. II only
 C. III only
 D. I, II, and III are all true
 E. I, II, and III are all false

22. Given the function $f(x) = 5 - 2x^2, x \leq 0$ and its graph, determine which of the following statements is/are true. (each tick mark represents one unit on the graph)
 (*Lessons 21, 34*)

- | | |
|------|---|
| I. | The range of f is $(-\infty, 0]$ |
| II. | $f^{-1}(x) = -\sqrt{\frac{5-x}{2}}$ |
| III. | The graph of f^{-1} will pass through the point $(3, -1)$ |

- A. I and II only
 B. I and III only
 C. II and III only
 D. I, II, and III are all true
 E. I, II, and III are all false



23. Solve for x . Choose the answer that best describes the solution(s). (*Lesson 14*)

$$x^4 - x^2 - 6 = 0$$

- A. There are four real solutions.
- B. There are three real solutions.
- C. There are two real solutions.
- D. There is one real solutions.
- E. There are no real solutions.

24. Solve $81x^2 \geq 16x$ and express the solutions in interval notation. (*Lesson 28*)

- A. $(-\infty, 0] \cup \left[\frac{16}{81}, \infty\right)$
- B. $\left[-\frac{4}{9}, \frac{4}{9}\right]$
- C. $(-\infty, \infty)$
- D. $\left[\frac{16}{81}, \infty\right)$
- E. $\left(-\infty, -\frac{4}{9}\right] \cup \left[\frac{4}{9}, \infty\right)$

25. Solve the inequality and express the solution in interval notation. (*Lesson 15*)

$$-\frac{1}{2} < \frac{3-2x}{5} \leq \frac{3}{2}$$

- A. $\left[-\frac{9}{4}, \frac{11}{4}\right)$
- B. $\left(-\frac{9}{4}, \frac{11}{4}\right]$
- C. $\left[-\frac{11}{4}, \frac{9}{4}\right)$
- D. $\left(-\frac{11}{4}, \frac{9}{4}\right]$
- E. None of the above

26. Simplify; do not include negative exponents in your final answer. (*Lesson 6*)

$$\frac{xy^{-1}}{(x+y)^{-1}}$$

A. $\frac{x(x+y)}{y}$

B. $\frac{x^2}{x+y}$

C. $\frac{x+y}{xy}$

D. $\frac{xy}{x+y}$

E. None of the above

27. Find all values of c , so that the solutions of the following equation are real numbers:
(*Lesson 11*)

$$2x^2 - 4x + c = 0$$

A. $c = 2$

B. $c > 2$

C. $c \geq 2$

D. $c \leq 2$

E. None of the above

28. Which of the following equations is/are true? (*Lesson 3*)

I.	$(x+y)^2 = x^2 + y^2$
II.	$(\sqrt{x} + \sqrt{y})(\sqrt{x} - \sqrt{y}) = x - y$
III.	$(x-y)^2 - (x+y)^2 = -4xy$

A. I only

B. II only

C. III only

D. I and II only

E. II and III only

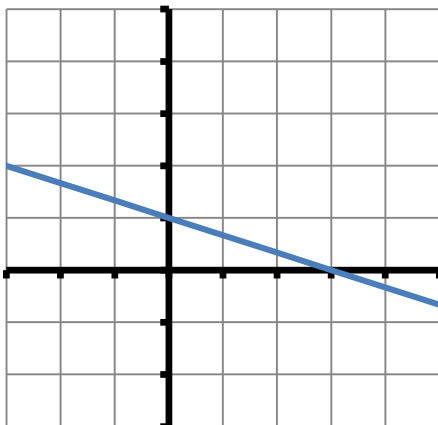
29. Which of the following statements is **TRUE** regarding the solutions of the following system?
(Lesson 31)

$$\begin{aligned}2x^2 + y^2 &= 1 \\ x - y &= 1\end{aligned}$$

- A. There is a solution in QI
 - B. There is a solution in QII
 - C. There is a solution in QIII
 - D. There is a solution in QIV
 - E. There is a solution that lies on the x -axis
30. If $(2, 3)$ is the midpoint of segment AB , and point A has coordinates $(1, -2)$, find the coordinates of the point B . (Lesson 16)

- A. $(1, 5)$
- B. $(3, 1)$
- C. $(3, 8)$
- D. $\left(\frac{3}{2}, \frac{1}{2}\right)$
- E. None of the above

31. The slope of a line **perpendicular** to the line drawn is? (Lesson 18)
(each tick mark represents one unit on the graph)



- A. $\frac{1}{3}$
- B. $-\frac{1}{3}$
- C. -3
- D. 3
- E. None of the above

32. M varies jointly with x cubed and y , and inversely with the square root of z . Find the constant of proportionality k if $M = 64$ when $x = 8$, $y = 5$, and $z = 4$. (Lesson 30)

A. $k = \frac{64}{5}$

B. $k = \frac{1}{20}$

C. $k = \frac{5}{4}$

D. $k = \frac{2}{5}$

E. None of the above

33. Given that $\log_3 m = 8$, $\log_3 n = 10$, and $\log_3 p = 6$, calculate $\log_3 \left(\frac{\sqrt{mn}}{p^3} \right)$.
(hint: use the properties of logarithms, then make a substitution) (Lesson 38)

A. -9

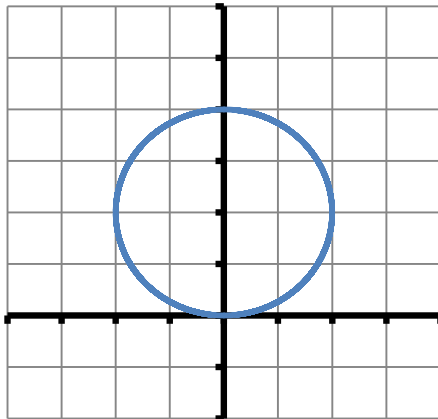
B. $\frac{2\sqrt{5}}{27}$

C. 22

D. -56

E. -4

34. The equation for the circle shown is? (Lesson 17)
(each tick mark represents one unit on the graph)



A. $x^2 + y^2 = 4$

B. $x^2 + y^2 - 4y = 0$

C. $x^2(y - 2) = 4$

D. $x^2 + y^2 + 4y = 0$

E. $x^2 + y^2 + 4x + 4y - 8 = 0$

35. Given the functions $f(x) = \frac{2-x}{x+4}$ and $g(x) = x - 1$, determine which of the following is/are true. (Lessons 27, 34)

I. $\left(\frac{g}{f}\right)(2) = 0$

II. $(f \circ g)(x) = 0$ when $x = -3$

III. $f^{-1}(x) = \frac{1-2x}{x+1}$

- A. I. only
B. II. only
C. III. only
D. I, II, and III are all true
E. I, II, and III are all false

36. If $f(x) = \frac{x}{x^2+1}$, find $f\left(\frac{1}{3}\right)$ and $\frac{1}{f(3)}$. (Lesson 20)

- A. $f\left(\frac{1}{3}\right) = \frac{3}{10}, \frac{1}{f(3)} = \frac{3}{10}$
B. $f\left(\frac{1}{3}\right) = \frac{10}{27}, \frac{1}{f(3)} = \frac{3}{10}$
C. $f\left(\frac{1}{3}\right) = \frac{10}{27}, \frac{1}{f(3)} = \frac{10}{13}$
D. $f\left(\frac{1}{3}\right) = \frac{3}{10}, \frac{1}{f(3)} = \frac{10}{3}$
E. None of the above

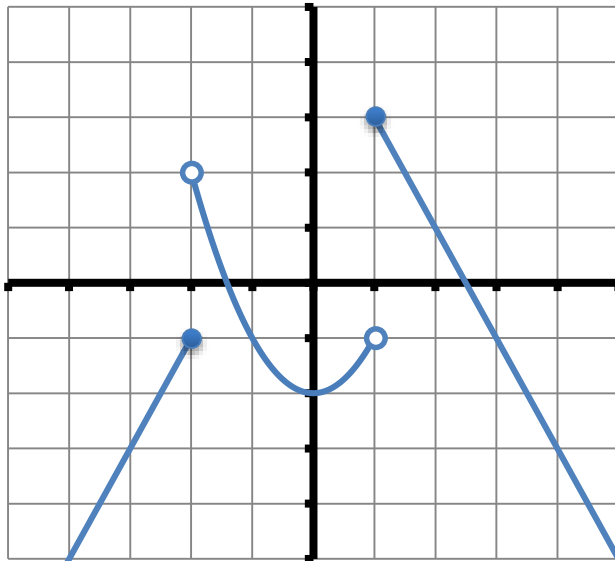
37. Solve $x^2 + 5x + 6 \leq 0$ and express the solutions in interval notation. (Lesson 28)

- A. $[-3, -2]$
B. $[-3, 2]$
C. $[2, 3]$
D. $[-6, 1]$
E. $[-1, 6]$

38. Solve the Pythagorean theorem $a^2 + b^2 = c^2$ for b . (Lesson 11)

- A. $b = -\sqrt{c^2 - a^2}$
- B. $b = c - a$
- C. $b = \sqrt{c^2 - a^2}$
- D. $b = a - c$
- E. $b = \sqrt{c^2 + a^2}$

39. Which of the following statements about the graph of f is/are true? (Lesson 24)
(each tick mark represents one unit on the graph)



- | | |
|------|---|
| I. | Increasing intervals: $(-\infty, -2] \cup [0, 1)$ |
| II. | Range: $(-\infty, 3]$ |
| III. | y-intercept: $(0, 2)$ |

- A. I only
- B. I and II only
- C. I and III only
- D. I, II, and III are all true
- E. I, II, and III are all false

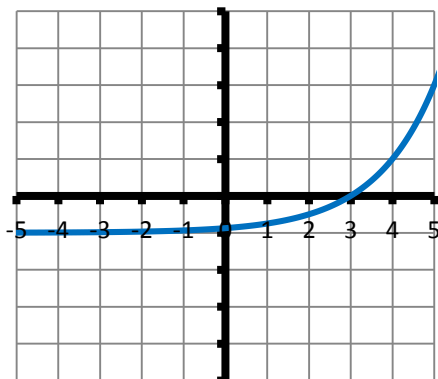
40. If $x < 0$ and $y > 0$, which of the following inequalities is/are true? (Lesson 1)

- | | |
|------|----------------------|
| I. | $x^2y > 0$ |
| II. | $\frac{y-x}{xy} < 0$ |
| III. | $y(x - y) < 0$ |

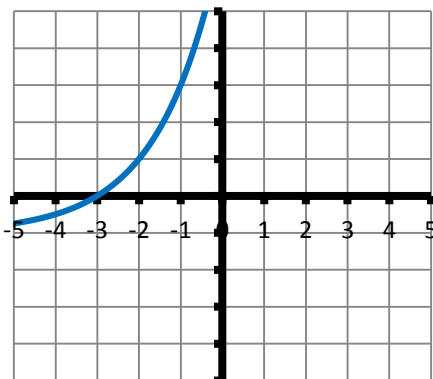
- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II, and III are all true
- E. None of the above

41. If $f(x) = 2^x$, which of the following graphs represents $f(x - 3) + 1$? (*Lessons 22, 23, 35*)
(each tick mark represents one unit on the graph)

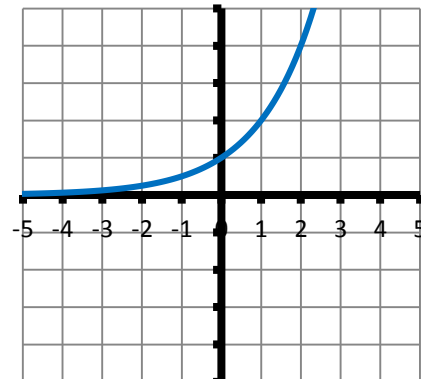
A.



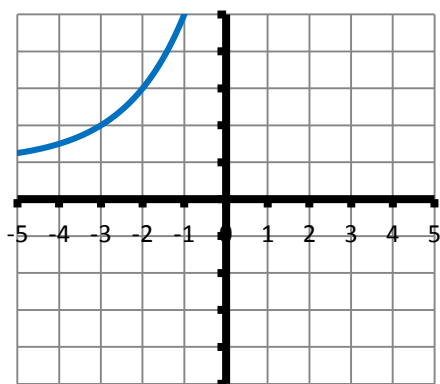
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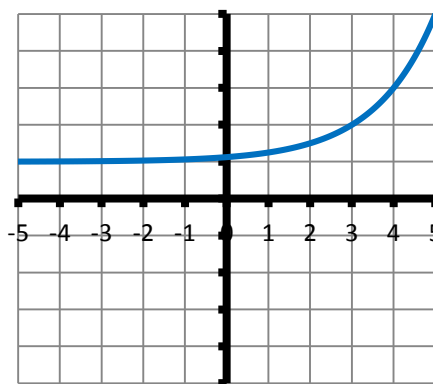
C.



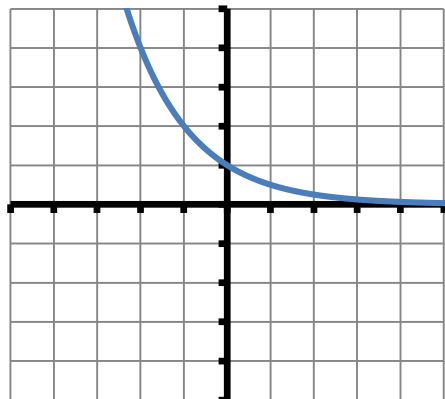
D.



E.



42. Given below is the graph of which of the following functions? (*Lesson 35*)
(each tick mark represents one unit on the graph)



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

B. $g(x) = 2^x$

C. $h(x) = -2^x$

D. $j(x) = -\left(\frac{1}{2}\right)^x$

E. $k(x) = 1 - 2^x$

43. Solve $\frac{(x-1)^2(3-x)}{x+2} > 0$ and express the solutions in interval notation. (*Lesson 28*)

- A. $(-2, 3]$
- B. $(-2, 1] \cup [1, 3)$
- C. $(-\infty, -2) \cup (3, \infty)$
- D. $(-2, 3)$
- E. $(-2, 1) \cup (1, 3)$

44. Solve the system of equations $\begin{cases} x^2 + y^2 = 25 \\ y = x^2 - 5 \end{cases}$ and determine which of the following statements is/are true regarding the solution(s). (*Lesson 31*)

- I. One solution is an x -intercept.
- II. There are three solutions.
- III. All solutions lie above the x -axis.

- A. I only
- B. II only
- C. I and III only
- D. II and III only
- E. I, II, and III are all true

45. A truck enters a freeway traveling 40 mph. One hour later a car enters the same freeway traveling 55 mph. After how many miles will the car overtake the truck? (*Lesson 8 or Lesson 33*)

- A. $146\frac{2}{3}$ miles
- B. $201\frac{2}{3}$ miles
- C. 120 miles
- D. $106\frac{2}{3}$ miles
- E. None of the above

46. Solve for x : $3^{x-5} = 4$. (*Lesson 40*)

A. $x = \log 4 + 5 \log 3$

B. $x = 5 + \log\left(\frac{4}{3}\right)$

C. $x = 5 + \frac{\log 4}{\log 3}$

D. $x = 5 + \log 4$

E. $x = \frac{5+\log 4}{\log 3}$

47. Solve for x : (*Lesson 39*)

$$\log_3 \sqrt{2x+3} = 2$$

A. $x = \frac{5}{2}$

B. $x = \frac{3}{2}$

C. $x = 39$

D. $x = 17$

E. $x = 3$

48. Let $y = f(x)$ be a function with domain $D = [-7, 8]$ and range $R = [-12, 9]$. Determine which of the following statements is/are true? (*Lessons 22, 23*)

- I. The range of $y = \frac{1}{2}f(-x) + 3$ is $[-8, 7]$
II. The domain of $y = -f(2x) - 2$ is $[-14, 16]$
III. The range of $y = \frac{2}{3}f(x-4) - 1$ is $[-9, 5]$
IV. The domain of $y = -f\left(-\frac{3}{2}x\right)$ is $\left[-\frac{21}{2}, 12\right]$

A. I and III only

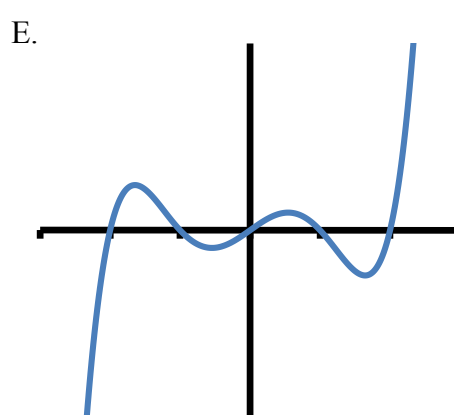
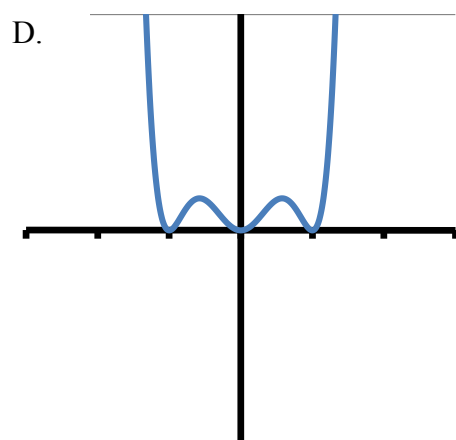
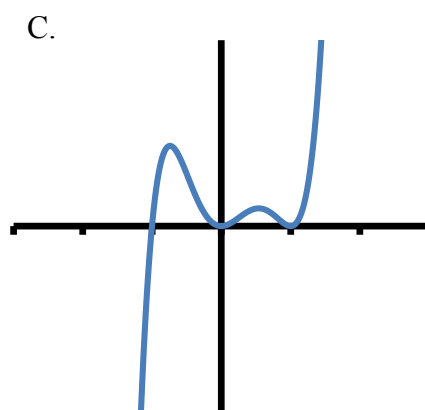
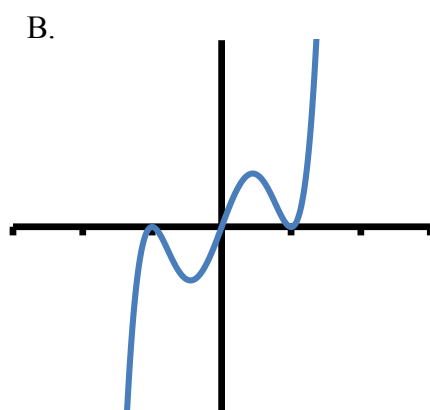
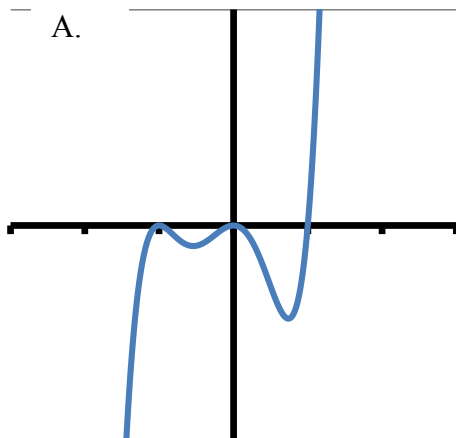
B. II and IV only

C. I only

D. I, II, and III only

E. III only

49. Which of the following is the graph of the function $f(x) = x^2(x - 1)(x + 1)^2$?
(each tick mark represents one unit on the graph) (*Lesson 29*)



50. Which of the following statements is/are true regarding the graph of $f(x) = 2 + 2^x$?
(*Lesson 35*)

- | | |
|------|------------------------------------|
| I. | $f(x) = 0$, when $x = -1$ |
| II. | $f(0) = 2$ |
| III. | The domain of f is $(2, \infty)$ |

- A. I only
 B. II only
 C. III only
 D. I and III only
 E. None of the above

51. Which of the following systems has no solution? (*Lesson 32*)

- A. $\begin{cases} 2x + 3y = 8 \\ 3x - 2y = 4 \end{cases}$
- B. $\begin{cases} 3x + 4y = 5 \\ 6x + 4y = 10 \end{cases}$
- C. $\begin{cases} 2x - 3y = 4 \\ -4x + 6y = 3 \end{cases}$
- D. $\begin{cases} x - 4y = 6 \\ 2x - 4y = 6 \end{cases}$
- E. $\begin{cases} 3x - 2y = 4 \\ 6x + 4y = 8 \end{cases}$

52. Which of the following statements is/are true of the function $f(x) = \log_2 x$? (*Lessons 36, 37*)
(hint: sketch the graph of the function)

- I. f has a zero at $x = 1$
- II. f has a y -intercept at $(0, 1)$
- III. The domain of f is $(-\infty, \infty)$

- A. I only
- B. I and II only
- C. I and III only
- D. II and III only
- E. I, II, and III are all true

53. The value of a rare book is increasing **linearly**. It was worth \$54 in 1981 and \$62 in 1983. Which of the following **linear equations** represents the value (v) of the book t years after 1980? (*Lesson 19*)

- A. $v = 50 + 4t$
- B. $v = 48 + 3t$
- C. $v = 50 + 3t$
- D. $v = 51 + 4t$
- E. None of the above

54. If $f(x) = -x^2 + x + 2$, find $\frac{f(x+h)-f(x)}{h}$. (*Lessons 20, 21*)

- A. $-2x - h$
- B. $-h^2$
- C. $-2x - h^2 + h$
- D. $-h + 1$
- E. $-2x - h + 1$

55. Perform the indicated operations and simplify: (*Lesson 5*)

$$\frac{x}{x+1} - \frac{1}{x-1}$$

- A. $\frac{x-1}{2}$
- B. 1
- C. $\frac{x-1}{x+1}$
- D. $\frac{x^2-2x-1}{x^2-1}$
- E. $\frac{1}{x+1}$

56. If $\log_x 2 = 5$, solve for x . Write your answer correct to four decimal places. (*Lesson 39*)

- A. 2.2361
- B. 1.4142
- C. 0.6990
- D. 1.1487
- E. 0.3010

57. Solve the inequality: (*Lesson 15*)

$$2|-11 - 7x| - 2 \geq 10$$

- A. $\left[-\frac{17}{7}, -\frac{5}{7}\right]$
- B. $\left(-\infty, -\frac{17}{7}\right] \cup \left[-\frac{5}{7}, \infty\right)$
- C. $\left[\frac{5}{7}, \frac{17}{7}\right]$
- D. $\left(-\infty, \frac{5}{7}\right] \cup \left[\frac{17}{7}, \infty\right)$
- E. None of the above

58. Given the formula $N = n \cdot 2^{\frac{t}{a}}$, solve for a . (*Lesson 37*)

- A. $a = t \cdot \log_2\left(\frac{N}{n}\right)$
- B. $a = \frac{n \cdot 2^t}{N}$
- C. $a = 2t$
- D. $a = \frac{\log\left(\frac{N}{n}\right)}{t \cdot \log 2}$
- E. $a = \frac{\log(2^t)}{\log\left(\frac{N}{n}\right)}$

59. Solve for x and choose the answer that best describes the solution(s). (*Lesson 14*)

$$x = 4 + \sqrt{4x - 19}$$

- A. There is one solution.
It is negative.
- B. There are two solutions.
Both are positive.
- C. There is one solution.
It is positive.
- D. There are two solutions.
One is positive and one is negative.
- E. There is no solution for x .

60. Suppose y is directly proportional to the cube root of x and inversely proportional to the square of z . Find the constant of proportionality if $y = 6$ when $x = 8$ and $z = 4$. (*Lesson 30*)

A. 24

B. $\frac{3}{16}$

C. 6

D. $\frac{3}{128}$

E. 48

61. $x - 1$ is a factor which of the following polynomials? (*Lesson 4*)

A. $10x^2 + 13x - 3$

B. $x^2 - 5x - 6$

C. $6x^2 - 5x - 1$

D. All of the above

E. None of the above

62. Give the equation of the line in slope-intercept form which is parallel to the line $2x - 3y = 7$ and contains the point $(4, -1)$. (*Lesson 18*)

A. $y = \frac{3}{2}x - 7$

B. $y = -\frac{2}{3}x + \frac{5}{2}$

C. $y = \frac{2}{3}x - \frac{11}{3}$

D. $y = \frac{2}{3}x + \frac{14}{3}$

E. None of the above

63. Which of the following equations is/are true? (*Lesson 36*)

I. $\log_5 1 = \frac{1}{5}$
II. $\log_{11} 11^2 = 2$
III. $\ln e = 1$

- A. I and II only
- B. II and III only
- C. I and III only
- D. I, II, and III are all true
- E. I, II, and III are all false

64. Solve for p : (*Lesson 7*)

$$\frac{4}{2p-3} + \frac{10}{4p^2-9} = \frac{1}{2p+3}$$

- A. $p = -\frac{3}{2}$
- B. $p = \frac{5}{6}$
- C. $p = -\frac{25}{6}$
- D. There is no solution
- E. None of the above

65. The population, $P(t)$, of a certain town t years after 1970 is given by $P(t) = 100,000e^{0.022t}$. During what year will the population reach 140,000? (*Lesson 37*)

- A. 1980
- B. 1983
- C. 1985
- D. 1990
- E. 1993

66. Given $f(x) = \log_3 \left(\frac{7-x}{2} \right)$, which of the following is/are true? (*Lessons 36, 34*)

- I. The domain of f is $(-\infty, 7]$
 II. $f(-5) = 2$
 III. $f^{-1}(x) = 7 - 2(3^x)$

- A. I only
 B. I and II only
 C. II and III only
 D. I and III only
 E. III only

67. Simplify; do not include negative exponents in your final answer. (*Lesson 6*)

$$\frac{x - x^{-2}}{1 - x^{-2}}$$

You may need to use one of the factoring formulas for cubes:

$$\begin{aligned} x^3 - y^3 &= (x - y)(x^2 + xy + y^2) \\ x^3 + y^3 &= (x + y)(x^2 - xy + y^2) \end{aligned}$$

- A. x
 B. $\frac{x}{x+1}$
 C. $x - 1$
 D. $\frac{x^2+x+1}{x+1}$
 E. $x + 1$

68. Express as one logarithm: (*Lesson 38*)

$$\log \left(\frac{x^2}{y^3} \right) - \log(xy) - 4 \log \sqrt{y}$$

- A. $\log \left(\frac{x}{y^2} \right)$
 B. $\log \left(\frac{x}{y^6} \right)$
 C. $\log x^3$
 D. $\log \left(\frac{x}{y^8} \right)$
 E. $-4 \log \left(\frac{x^2}{y^3} - xy - \sqrt{y} \right)$

69. Solve $\frac{(4-x)^2}{x^2} \geq 0$ and express the solutions in interval notation. (*Lesson 28*)

- A. $(-\infty, \infty)$
- B. $(-\infty, 4) \cup (4, \infty)$
- C. $(-\infty, 0) \cup (0, \infty)$
- D. $(-\infty, 0] \cup [4, \infty)$
- E. $(0, \infty)$

70. An aquarium in the shape of a rectangular box is to have a height of 1.5 feet and a volume of 6 cubic feet. Let x denote the length of the base and y the width of the base. Express y as a function of x . (*Lesson 21*)

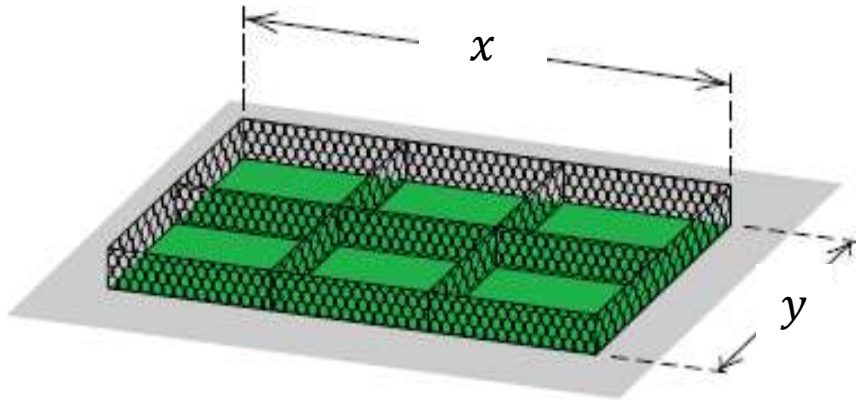
- A. $y(x) = 1.5x$
- B. $y(x) = \frac{4}{x}$
- C. $y(x) = x^2$
- D. $y(x) = \frac{6}{x}$
- E. $y(x) = 9x$

71. Solve the system of equations, then indicate the number of times the graphs intersect. (*Lesson 31*)

$$\begin{cases} x^2 + y^2 = 25 \\ 3x + 4y = 25 \end{cases}$$

- A. 0
- B. 1
- C. 2
- D. 3
- E. 4

72. Eight hundred feet of chain-link fence is to be used to construct six animal cages, as shown in the figure. Find the dimensions that maximize the enclosed area. (*Lesson 26*)



- A. $x = \frac{3}{800}; y = \frac{639,991}{3200}$
 B. $x = 200; y = 200$
 C. $x = \frac{400}{3}; y = 100$
 D. $x = 100; y = 125$
 E. $x = \frac{800}{3}; y = 200$

73. A certain city charges \$0.00361 per gallon of water used, up to 5,000 gallons, and \$0.00417 per gallon of water used for more than 5,000 gallons. Find a piecewise-defined function B that specifies the total bill for water usage of x gallons. (*Lesson 24*)

- A. $B(x) = \begin{cases} 0.00361, & \text{if } x \leq 5,000 \\ 0.00417, & \text{if } x > 5,000 \end{cases}$
 B. $B(x) = \begin{cases} 0.00361x, & \text{if } x \leq 5,000 \\ 0.00417x, & \text{if } x > 5,000 \end{cases}$
 C. $B(x) = \begin{cases} 0.00361x, & \text{if } x \leq 5,000 \\ 0.00778x, & \text{if } x > 5,000 \end{cases}$
 D. $B(x) = \begin{cases} 0.00361x, & \text{if } x \leq 5,000 \\ 0.00417x - 2.8, & \text{if } x > 5,000 \end{cases}$
 E. $B(x) = \begin{cases} 0.00361x, & \text{if } x \leq 5,000 \\ 0.00417x + 18.05, & \text{if } x > 5,000 \end{cases}$

74. Divide and simplify. (*Lesson 5*)

$$\frac{x^2 - 2x}{2x^2 + 5x - 3} \div \frac{x^2 - 5x + 6}{x^2 - 9}$$

- A. $\frac{x(x+2)(x-6)}{2x-3(x-3)^2}$
- B. $\frac{x}{2x-1}$
- C. $\frac{x(x+2)(x-6)}{2x-3}$
- D. $\frac{x(x-2)^2}{(2x-1)(x+3)^2}$
- E. None of the above

75. To fill an order for 150 office desks, a furniture distributor must ship the desks from two warehouses. The shipping cost per desk is \$48 from the western warehouse and \$70 from the eastern warehouse. If the total shipping charge is \$8,410, how many desks were shipped from the eastern warehouse? (*Lesson 8 or Lesson 33*)

- A. 55
- B. 80
- C. 70
- D. 95
- E. 100

76. If $x = 0$, which of the following functions is/are undefined? (*Lessons 20, 36*)

$$\begin{aligned} f(x) &= \frac{1}{x} \\ g(x) &= \sqrt{x} \\ h(x) &= \log x \\ k(x) &= \frac{x}{2} \end{aligned}$$

- A. f and g only
- B. f and h only
- C. g and h only
- D. g and k only
- E. h and k only

77. Parents of a newborn baby are given a gift of \$10,000 and will choose between two options to invest for their child's college fund. Option 1 is to invest the gift in a fund that pays an average annual interest rate of 11% compounded quarterly; option 2 is to invest the gift in a fund that pays an average annual interest rate of 10.75% compounded continuously. Calculate the value of each investment using the formulas $A = Pe^{rt}$ and $A = P\left(1 + \frac{r}{n}\right)^{nt}$. Assume the investments have terms of 18 years and round your answers to the nearest dollar. (Lesson 35)

A. Option 1 = \$70,517

Option 2 = \$69,240

B. Option 1 = \$67,494

Option 2 = \$72,427

C. Option 1 = \$72,427

Option 2 = \$69,240

D. Option 1 = \$67,494

Option 2 = \$69,240

E. Option 1 = \$69,240

Option 2 = \$70,517

78. Solve $P + N = \frac{C+2}{C}$ for C . (Lesson 7)

A. $C = \frac{2}{P+N}$

B. $C = \frac{PN}{2}$

C. $C = \frac{2}{PN-1}$

D. $C = \frac{P+N}{2}$

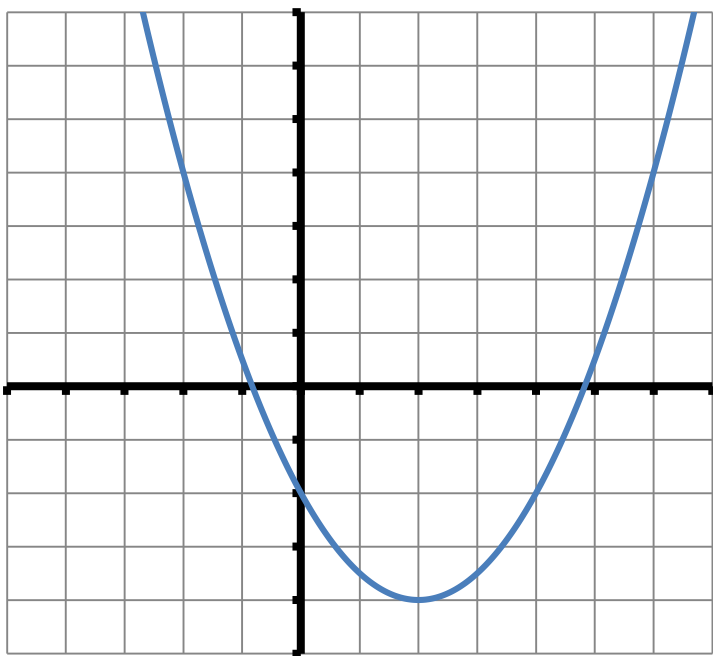
E. $C = \frac{2}{P+N-1}$

79. Express the number in the form $\frac{a}{b}$, where a and b are integers: (*Lessons 1, 2*)

$$-2^2 + \left(\frac{1}{2}\right)^0 + 16^{-\frac{3}{4}}$$

- A. -11
- B. $-\frac{31}{8}$
- C. $\frac{33}{8}$
- D. $\frac{41}{8}$
- E. $-\frac{23}{8}$

80. Find the function whose graph is given below. (*Lessons 25, 26*)
(each tick mark represents one unit on the graph)



- A. $f(x) = \frac{1}{2}x^2 + 2x - 2$
- B. $f(x) = -x^2 + 4x - 2$
- C. $f(x) = x^2 - 4x - 2$
- D. $f(x) = \frac{1}{2}x^2 - 2x + 2$
- E. $f(x) = \frac{1}{2}x^2 - 2x - 2$

ANSWERS

1. E	2. A	3. A	4. C
5. D	6. D	7. D	8. C
9. A	10. E	11. E	12. B
13. B	14. E	15. A	16. A
17. B	18. B	19. E	20. C
21. B	22. C	23. C	24. A
25. A	26. A	27. D	28. E
29. D	30. C	31. D	32. B
33. A	34. B	35. E	36. D
37. A	38. C	39. B	40. D
41. E	42. A	43. E	44. B
45. A	46. C	47. C	48. E
49. A	50. E	51. C	52. A
53. A	54. E	55. D	56. D
57. B	58. E	59. B	60. E
61. C	62. C	63. B	64. C
65. C	66. E	67. D	68. B
69. C	70. B	71. B	72. C
73. D	74. B	75. A	76. B
77. A	78. E	79. E	80. E

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