1. Simplify $\dfrac{\frac{15}{5}}{1-\frac{1}{2}}$

A. $\frac{2}{3}$

B. 2

C. $\frac{3}{2}$

D. 6

E. None of the above

2. Factor $16x^2 - 4y^8$

A. $(4x - y^2)(4x + y^2)$

B. $(4x - 2y^4)^2$

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

D. $4(2x - y^2)$

E. None of the above

3. Simplify $\left(\dfrac{4a^4b^8}{c^{-2}}\right)^{-\frac{1}{2}}$

A. $\frac{1}{2a^2b^4c}$

B. $\frac{2a^2b^4}{c}$

C. $\frac{a^4b^3}{16c^2}$

D. $\frac{c}{2a^2b^4}$

E. None of the above

4. Subtract and simplify.

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

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. Divide and simplify.

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

A. $\frac{(x-2)^2}{(x-3)^2(x+3)}$

B. $\frac{x+3}{(x+1)^2}$

C. $\frac{x+3}{x+1}$

D. $\frac{1}{x+3}$

E. None of the above

6. A job takes 4 hours for two people working together. If one person works alone he can do the job in 6 hours. How long will it take the other person working alone to complete the job?

A. $4\ hrs.$

B. $6\ hrs.$

C. $8\ hrs.$

D. $10\ hrs.$

E. None of the above

7. Simplify; do not include negative exponents in your final answer.

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

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

8. Simplify by rationalizing the denominator.

$$\frac{\sqrt{3}}{2+\sqrt{3}}$$

A. $\frac{1}{2}$

B. 2

C. $2\sqrt{3}-3$

D. $\sqrt{3}+2$

E. $\frac{2\sqrt{3}-3}{7}$

9. 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.

A. 73

B. 72

C. 12

D. 8

E. None of the above

10. If $A = P(1 + rt)$, then $t =$

A. $\frac{A-P}{r}$

B. $A - P$

C. $\frac{A-P}{P}$

D. $\frac{A}{P}$

E. None of the above

11. 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?

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

12. A square of side x is inscribed in a circle. Express the area A of the circle as a function of x.

A. $A = \frac{\pi}{2}x^2$

B. $A = x^2$

C. $A = \pi x^2$

D. $A = \frac{\pi}{4}x^2$

E. None of the above

13. Solve for p:

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

A. $p=-\frac{3}{2}$

B. $p=\frac{5}{6}$

C. There is no solution

D. $p=-\frac{25}{6}$

E. None of the above

14. 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?

A. 10 ml

B. 8 ml

C. 6 ml

D. 4 ml

E. None of the above

15. Solve for x and list all the real solutions:

$$x=\sqrt{14+5x}$$

A. $x=3, x=14$

B. $x=-2, x=7$

C. $x=-2$

D. $x=\frac{14}{3}$

E. None of the above

16. Solve for m and list all solutions (real and/or imaginary):

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

A. $m = 2, 3$

B. $m = -2, \pm\sqrt{3}$

C. $m = \pm\sqrt{3}, \pm 2i$

D. $m = \pm\sqrt{3}, \pm\sqrt{2}i$

E. None of the above

17. Solve the inequality and express the solution in terms of intervals

$$3x - 2 > 6x + 1$$

A. $(-\infty, -1)$

B. $(-1, 1)$

C. $(\infty, -1]$

D. $(-1, \infty)$

E. None of the above

18. Solve the inequality:

$$|6 - 2x| \leq 3$$

A. $x \geq \frac{3}{2}$

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

C. $\frac{3}{2} \leq x \leq \frac{9}{2}$

D. $-\frac{9}{2} \leq x \leq -\frac{3}{2}$

E. None of the above

19. Find all values of k so that the solutions of the following equation are real numbers:

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

A. $k = 2$

B. $k > 2$

C. $k \geq 2$

D. $k \leq 2$

E. None of the above

20. 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.

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

21. Solve for x:

$$2x^2 + y^2 = 1$$
$$x - y = 1$$

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

B. $x = 0, \frac{2}{3}$

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

D. $x = 0, \frac{3}{2}$

E. None of the above

22. If the point $(2, 3)$ is midway between A and B and the point A has coordinates $(1, -2)$, find the coordinates of the point B.

A. $(1, 5)$

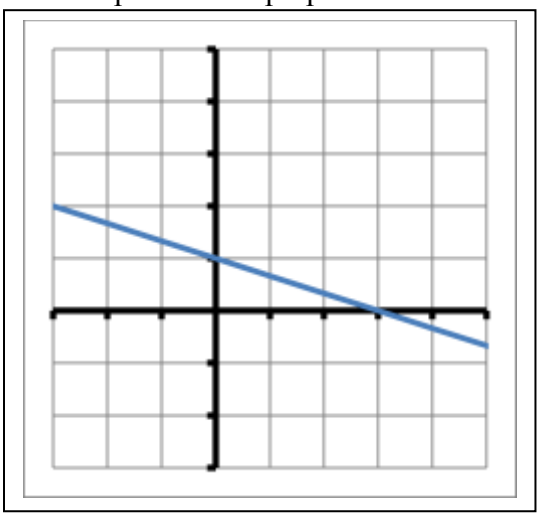
B. $(3, 1)$

C. $(3, 8)$

D. $\left(\frac{3}{2}, \frac{1}{2}\right)$

E. None of the above

23. The slope of a line perpendicular to the line drawn is:



A. $\frac{1}{3}$

B. $-\frac{1}{3}$

C. -3

D. 3

E. None of the above

24. If m varies directly as the product of x and y and inversely as z, find the constant of proportionality k if $m = 3$ when $x = 4, y = 2,$ and $z = 6$.

A. $k = \frac{1}{6}$

B. $k = \frac{9}{4}$

C. $k = 3$

D. $k = \frac{1}{4}$

E. None of the above

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

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

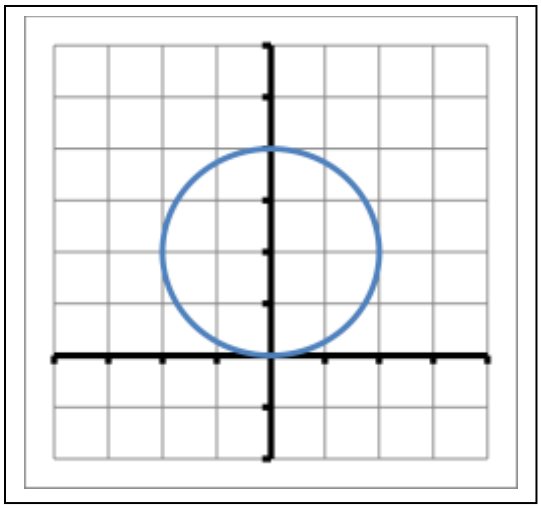
B. $y = -\frac{2}{3}x + \frac{5}{2}$

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

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

E. None of the above

26. The equation for the circle show is:



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

27. Determine $(g \circ f)(x)$ for the following functions: $f(x) = 1 - \sqrt{x}$ and $g(x) = \frac{1}{x}$.

A. $-\sqrt{x}$

B. $1 - \sqrt{\frac{1}{x}}$

C. $1 - \sqrt{x}$

D. $\frac{1}{1-\sqrt{x}}$

E. $\frac{1}{\sqrt{x}}$

28. If $f(x) = \frac{x}{x^2+1}$, find $\frac{1}{f(3)}$.

A. $\frac{3}{10}$

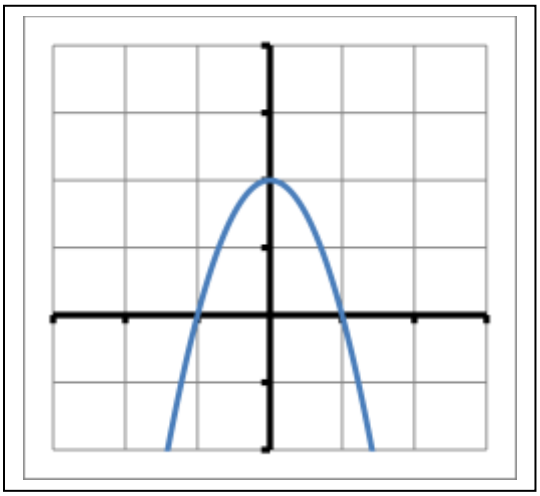
B. $\frac{3}{16}$

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

D. $\frac{10}{3}$

E. None of the above

29. The graph below could best be described by which equation?



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

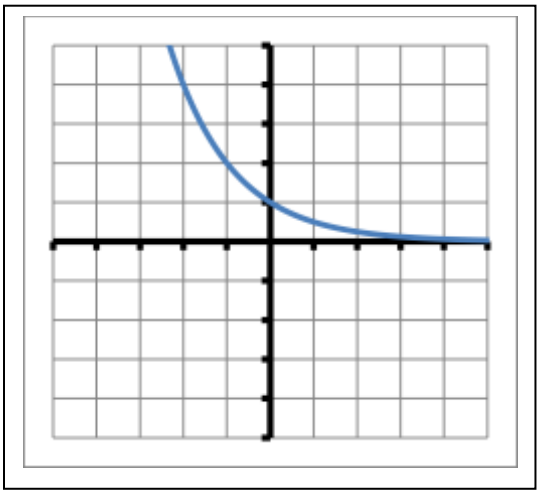
B. $y = -2x^2 + 2$

C. $y = -2x^2 - 2$

D. $y = 2x^2 - 2$

E. $y = -(x-2)^2$

30. The figure below most closely resembles the graph of which function?



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

B. $y = 2^x$

C. $y = -2^x$

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

E. $y = 1 - 2^x$

31. Express as one logarithm: $\log_b y^3 + \log_b y^2 - \log_b y^4$

A. $\log_b y^2$
B. $\log_b y$
C. $\log_b(y^3 + y^2 - y^4)$
D. $\log_b\left(\frac{y^3+y^2}{y^4}\right)$
E. None of the above

32. Which are true of the function $f(x) = \log_a x$ if $a > 1$? List all which are correct.

I.	f is an increasing function
II.	f has a as an x-intercept
III.	f has 1 as a y-intercept
IV.	The domain of f is $(0, \infty)$

A. I, II, and III
B. I and II
C. II and IV
D. I and IV
E. I and III

33. Which of the following is equivalent to $\log\left(\frac{432}{\sqrt{0.095}\sqrt[3]{72.1}}\right)$?

A. $\log 432 - \frac{1}{2}\log 0.095 - 3\log 72.1$
B. $\log 432 - \frac{1}{2}\log 0.095 - \frac{1}{3}\log 72.1$
C. $\log 432 - 2\log 0.095 + 3\log 72.1$
D. $\log 432 - \frac{1}{2}\log 0.095 + \frac{1}{3}\log 72.1$
E. $\log 432 - 2\log 0.095 - 3\log 72.1$

34. Solve for x: $3^{x-5} = 4$.

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

35. Solve for x: $\log_3 \sqrt{2x+3} = 2$

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

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

C. $x = 39$

D. $x = 17$

E. $x = 3$

36. Given that $\log_3 m = 8, \log_3 n = 10,$ and $\log_3 p = 6$, calculate $\log_3\left(\frac{\sqrt{mn}}{p^3}\right)$

A. -9

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

C. 22

D. -56

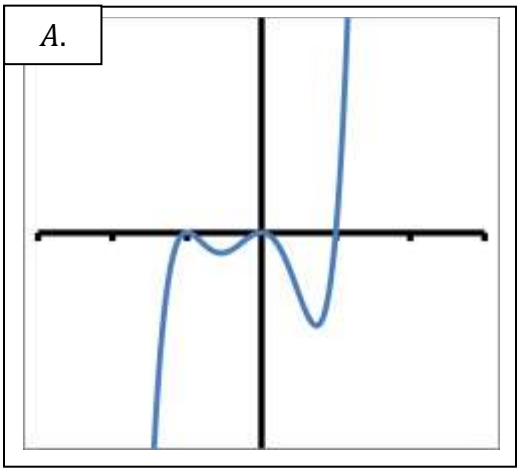
E. -4

37. The graph of $y = 2 + 2^x$ crosses the y-axis at

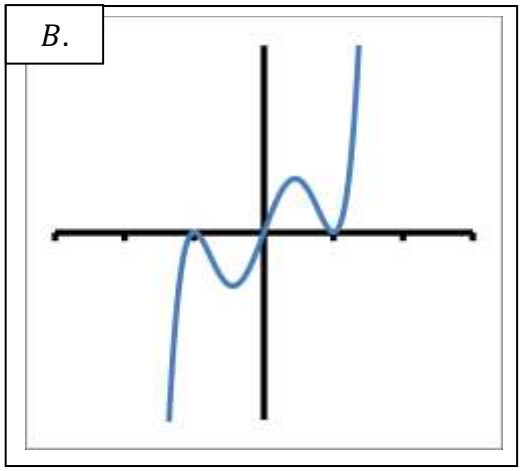
A. 0
B. 1
C. 2
D. 3
E. 4

38. Which of the following looks most like the graph of $y = x^2(x-1)(x+1)^2$

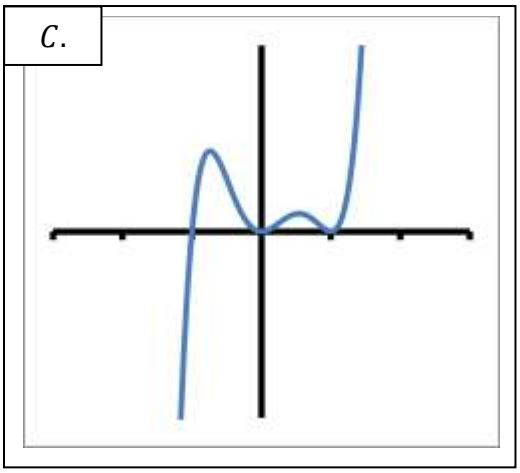
$A.$



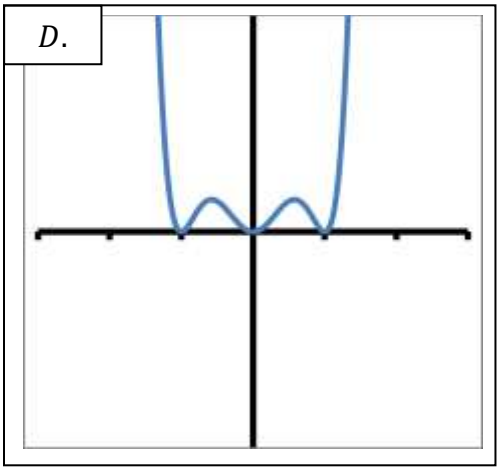
$B.$



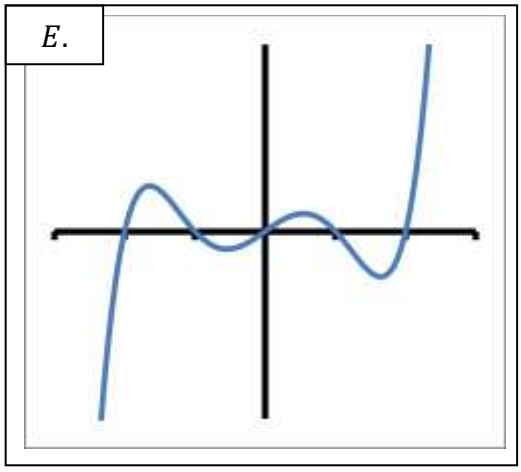
$C.$



$D.$



$E.$



39. Which set of equations below has no solution?

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. $\begin{cases} 3x - 2y = 4 \\ 6x + 4y = 8 \end{cases}$

40. Determine where the two lines $x + 4y = 3$ and $2x - 6y = 8$ intersect.

A. $\left(-\frac{12}{5}, \frac{6}{5}\right)$

B. $\left(\frac{1}{3}, \frac{4}{9}\right)$

C. $\left(\frac{2}{7}, \frac{5}{7}\right)$

D. $\left(\frac{1}{8}, \frac{2}{5}\right)$

E. None of the above

41. The value of a rare book is increasing linearly. It was worth \$54 in 1981 and \$62 in 1983. What is the formula for the value (v) of the book t years after 1980?

A. $v = 50 + 4t$

B. $v = 48 + 3t$

C. $v = 50 + 3t$

D. $v = 51 + 4t$

E. None of the above

42. If $f(x) = x^2 - 2x + 4$ then $\frac{f(x+h)-f(x)}{h} =$

A. $2x + h - 2$

B. $x + 2h - 2$

C. $x + 2h + 2$

D. $2x - h - 2$

E. $2x - h + 2$

43. 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.

A. $y = 1.5x$

B. $y = \frac{4}{x}$

C. $y = x^2$

D. $y = \frac{6}{x}$

E. $y = 9x$

44. If $\log_x 2 = 5$, solve for x. Write your answer correct to four decimal places. (Hint: Change to exponential notation.)

A. 2.2361

B. 1.4142

C. 0.6990

D. 1.1487

E. 0.3010

ANSWERS

1. D; 2. C; 3. A; 4. C; 5. B; 6. E; 7. A; 8. C; 9. B; 10. E; 11. A; 12. A; 13. D; 14. B; 15. E; 16. D; 17. A; 18. C; 19. D; 20. A; 21. B; 22. C; 23. D; 24. B; 25. C; 26. B; 27. D; 28. D; 29. B; 30. A; 31. B; 32. D; 33. B; 34. C; 35. C; 36. A; 37. D; 38. A; 39. C; 40. E; 41. A; 42. A; 43. B; 44. D