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ANSWERS must be on DATALINK Form 1200, Reorder #26760-RR.

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

Find the vertex of the graph of the function.

1) $f(x) = 3x^2 + 24x + 50$

A) $(-4, 2)$

B) $(-1, 5)$

C) $(2, -4)$

D) $(5, -1)$

1) A **Divide using synthetic division, and write a summary statement in fraction form.**

2) $\frac{2x^4 - x^3 - 15x^2 + 3x}{x + 3}$

A) $2x^3 - 7x^2 + 6x - 15 + \frac{-45}{x + 3}$

B) $2x^3 - 7x^2 + 6x - 15 + \frac{45}{x + 3}$

C) $2x^3 + 5x^2 + 3 + \frac{9}{x + 3}$

D) $2x^3 - 5x^2 + 3 + \frac{-9}{x + 3}$

2) B **Write the product in standard form.**

3) $(5 + 2i)(5 - 2i)$

A) 21

B) 29

C) $25 + 4i^2$

D) $25 - 4i^2$

3) B **Write the sum or difference in the standard form $a + bi$.**

4) $8i + (-2 - i)$

A) $-2 + 9i$

B) $2 - 7i$

C) $2 - 9i$

D) $-2 + 7i$

4) D **Find the product of the complex number and its conjugate.**

5) $1 - \sqrt{7}i$

A) 8

B) -48

C) -6

D) 50

5) A **State the domain of the rational function.**

6) $f(x) = \frac{x - 5}{x^2 - 9}$

A) $(-\infty, -3) \cup (-3, 3) \cup (3, \infty)$

B) $(-\infty, 3) \cup (3, \infty)$

C) $(-\infty, 5) \cup (5, \infty)$

D) $(-\infty, -3) \cup (-3, \infty)$

6) A **Solve the problem.**7) $A(x) = -.015x^3 + 1.05x$ gives the alcohol level in an average person's blood x hrs after drinking 8 oz of 100-proof whiskey. If the level exceeds 1.5 units, a person is legally drunk. Would a person be drunk after 2 hours?

A) Yes

B) No

7) B **Write the expression in the form bi , where b is a real number.**

8) $\sqrt{-36}$

A) $6i$

B) $i\sqrt{6}$

C) ± 6

D) $-6i$

8) A

Divide $f(x)$ by $d(x)$, and write a summary statement in the form indicated.

9) $f(x) = x^3 + 3$; $d(x) = x + 4$ (Write answer in fractional form)

A) $\frac{f(x)}{(x+4)} = (x^2 + 4x + 16) + \frac{-61}{(x+4)}$

C) $\frac{f(x)}{(x+4)} = (x^2 - 4x + 16) + \frac{-61}{(x+4)}$

B) $\frac{f(x)}{(x+4)} = (x^2 - 4x + 16) + \frac{-64}{(x+4)}$

D) $\frac{f(x)}{(x+4)} = (x^2 + 4x + 16) + \frac{-64}{(x+4)}$

9) C

Find the vertex of the graph of the function.

10) $f(x) = 3(x - \sqrt{7})^2 + 10$

A) $(-\sqrt{7}, 10)$

B) $(7, 10)$

C) $(\sqrt{7}, 10)$

D) $(-7, 10)$

10) C

Solve the problem.

11) Suppose you contribute to a fund that earns 6.5% annual interest. What should your quarterly payment be if you want to accumulate \$160,000 in 13 years?

A) \$15,851.01

B) \$2377.65

C) \$2972.06

D) \$1981.38

11) D

12) How long will it take for prices in the economy to double at a 13% annual inflation rate? (Round to the nearest year.)

A) 5 yr

B) 6 yr

C) 9 yr

D) 23 yr

12) B

Use the change of base rule to find the logarithm to four decimal places.

13) $\log_8 0.989$

A) 8.0890

B) -0.0048

C) -0.0053

D) -187.9985

13) C

Rewrite the expression as a sum or difference or multiple of logarithms.

14) $\log_7 \left(\frac{6\sqrt{x}}{y} \right)$

A) $\log_7 (6\sqrt{x}) - \log_7 y$

B) $\log_7 6 \cdot \frac{1}{2} \log_7 x \div \log_7 y$

C) $\log_7 6 + \frac{1}{2} \log_7 x - \log_7 y$

D) $\log_7 y - \log_7 6 - \frac{1}{2} \log_7 x$

14) C

Use the product, quotient, and power rules of logarithms to rewrite the expression as a single logarithm. Assume that all variables represent positive real numbers.

15) $\frac{2}{5} \log_a x + \frac{1}{9} \log_a y$

A) $\log_a (xy^{2/45})$

B) $\frac{2}{45} \log_a xy$

C) $\log_a (y^{2/45})$

D) $\log_a (x^{2/5} y^{1/9})$

15) B

Solve the equation.

16) $e^x - 16 = \frac{-64}{e^x}$

A) 0.903, 0.903

B) 8, 8

C) -1

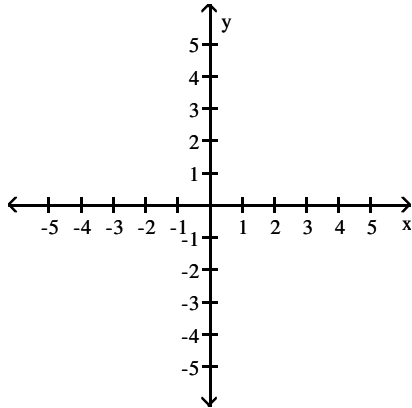
D) 2.079, 2.079

16) D

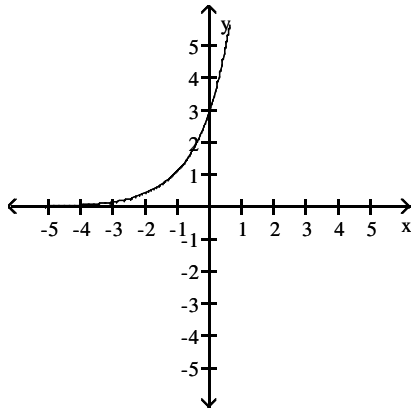
Choose the graph which matches the function.

17) $f(x) = 3e^{-x}$

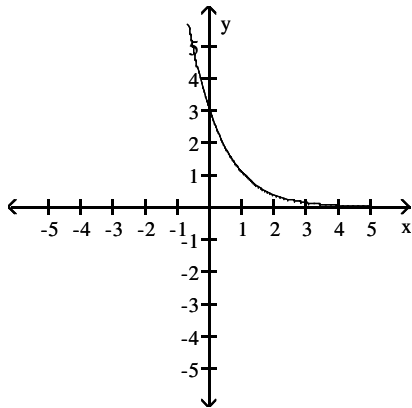
17) C



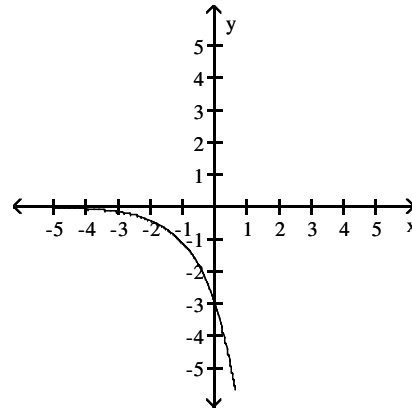
A)



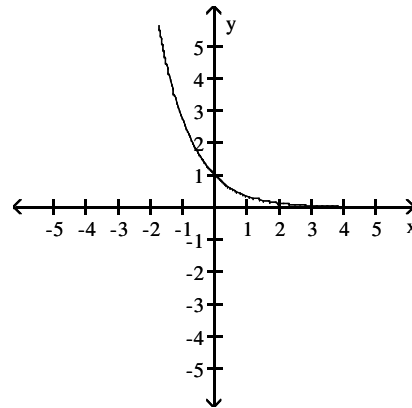
C)



B)



D)



Find the determinant of the given matrix.

18)

$$\begin{bmatrix} 9 & -8 & 9 \\ 0 & 4 & 2 \\ 0 & 0 & -3 \end{bmatrix}$$

A) -108

B) -124

C) 108

D) 92

18) A

Solve the system of equations by finding the reduced row echelon form for the augmented matrix.

19) $x + 4y = -5$

$4x - y = 14$

$-3x + 4y = -1$

A) $(-1, -1)$

B) $(7, -3)$

C) $(3, -2)$

D) No solution

19) D

Solve the system graphically.

20) $y = \ln(3x - 2)$

$x^2 + 3y^2 = 7$

A) $\approx(0.74, -1.47)$ and $\approx(1.73, 1.16)$

B) $\approx(1.73, -1.16)$ and $\approx(0.74, 1.47)$

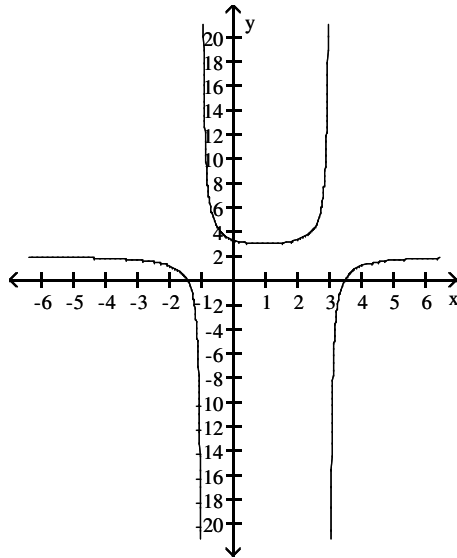
C) $\approx(0.77, 1.46)$ and $\approx(-0.59, -1.49)$

D) $\approx(5.25, 2.62)$

20) A

Determine which function matches the graph. Do this without using your grapher.

21)



A: $y = x - 3 + \frac{1}{x - 3} + \frac{1}{x + 1}$

B: $y = x - 3 - \frac{1}{x - 3} + \frac{1}{x + 1}$

C: $y = 2 + \frac{1}{x - 3} - \frac{1}{x + 1}$

D: $y = 2 - \frac{1}{x - 3} + \frac{1}{x + 1}$

A) A

B) B

C) D

D) C

21) D

Solve the problem.

22) The total number of cars sold at a used car lot for the years 1996 and 1997 was 1044. From 1996 to 1997 the number of cars sold declined by 158. How many cars were sold in 1997?

A) 437

B) 453

C) 443

D) 449

22) C

Solve the system algebraically.

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

$y = 4x^2$

A) (0, 0) and (3, 36)

C) (0, 0) and (5, 125)

B) (5, 100)

D) (0, 0) and (5, 100)

23) D

Decompose into partial fractions.

24) $\frac{9x^2 - 117x + 6}{(x^2 + 3x - 2)(x - 9)}$

A) $\frac{12x}{x^2 + 3x - 2} + \frac{3}{x - 9}$

C) $\frac{12x}{x^2 + 3x - 2} - \frac{3}{x - 9}$

B) $\frac{12x}{x - 9} - \frac{3}{x^2 + 3x - 2}$

D) $\frac{3x}{x^2 + 3x - 2} - \frac{12}{x - 9}$

24) C

Find the vertex, focus, directrix, and focal width of the parabola.

25) $(x - 3)^2 = 16(y - 6)$

A) Vertex: (6, 3); Focus: (10, 3); Directrix: $x = -1$; Focal width: 4

B) Vertex: (3, 6); Focus: (3, 10); Directrix: $y = 2$; Focal width: 16

C) Vertex: (-3, -6); Focus: (-3, 10); Directrix: $y = -22$; Focal width: 16

D) Vertex: (6, 3); Focus: (22, 3); Directrix: $x = -13$; Focal width: 16

25) B

Find a polynomial of lowest degree with only real coefficients and having the given zeros.

26) 8, -14, and $3 + 8i$

A) $f(x) = x^4 - 75x^2 + 1110x - 8176$

C) $f(x) = x^4 - 11x^3 - 64x^2 + 555x - 8176$

B) $f(x) = x^4 - 11x^3 + 64x^2 - 555x + 8176$

D) $f(x) = x^4 - 277.5x^2 + 1110x - 8176$

26) A

Use Descartes' Rule of Signs to determine the possible number of positive real zeros and the possible number of negative real zeros for the function.

27) $-9x^4 + 3x^3 - 7x^2 + 7x - 9 = 0$

A) Positive (4, 2, 0), negative (4, 2, 0)

C) Positive (2, 0), negative (2, 0)

B) Positive (4, 2, 0), negative (0)

D) Positive (2, 0), negative (4, 2, 0)

27) B

Find all complex zeros of the polynomial function. Give exact values. List multiple zeros as necessary.

28) $f(x) = x^4 - 6x^3 + 7x^2 - 6x + 6$

A) $i, -i, 3 + \sqrt{3}, 3 - \sqrt{3}$

C) $i, -i, -3 + \sqrt{3}, -3 - \sqrt{3}$

B) $i, -i, 3 + 2\sqrt{3}, 3 - 2\sqrt{3}$

D) $i, -i, 1 + \sqrt{3}, 1 - \sqrt{3}$

28) A

Give the equation of the oblique asymptote, if any.

29) $f(x) = \frac{x^2 - 9x + 3}{x + 9}$

A) $x = y + 9$

B) None

C) $y = x - 18$

D) $y = x + 12$

29) C

If f is one-to-one, find an equation for its inverse.

30) $f(x) = 8x^2 - 9, x \geq 0$

A) $f^{-1}(x) = \sqrt{\frac{8}{x+3}}, x \neq -9$

C) Not a one-to-one function

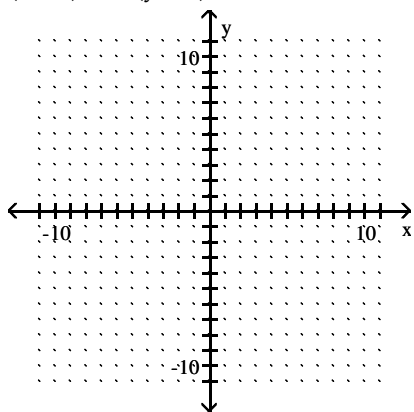
B) $f^{-1}(x) = \frac{8}{\sqrt{x+3}}$

D) $f^{-1}(x) = \sqrt{\frac{x+9}{8}}, x \geq -9$

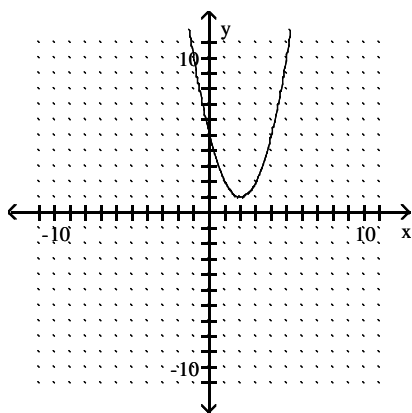
30) D

Graph the parabola.

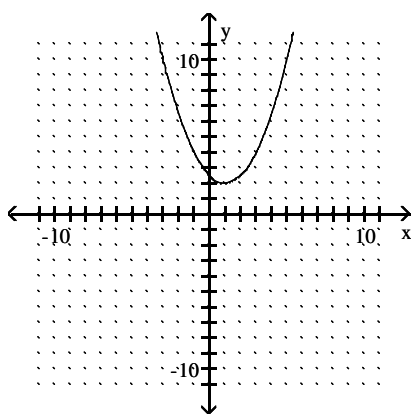
31) $(x-1)^2 = 2(y-2)$



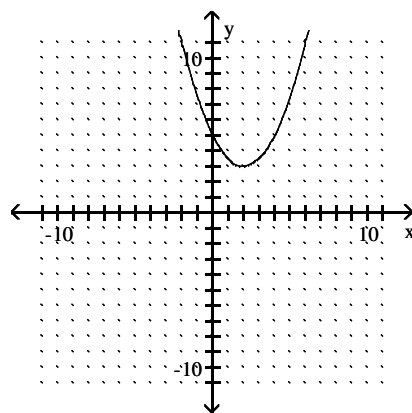
A)



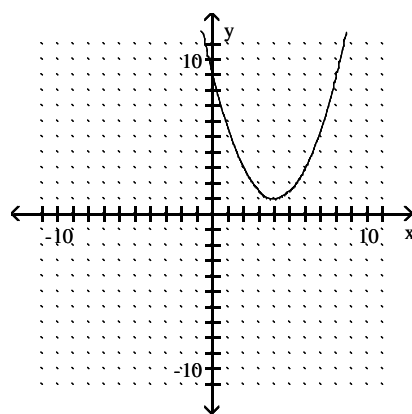
C)



B)



D)



31) C

Find an equation in standard form for the ellipse that satisfies the given conditions.

32) An ellipse with foci at $(-3, 7)$ and $(-3, 1)$; major axis length of 10

32) C

A) $\frac{(y-4)^2}{25} + \frac{(x-3)^2}{16} = 1$

B) $\frac{(x-4)^2}{25} + \frac{(y-3)^2}{16} = 1$

C) $\frac{(y-4)^2}{25} + \frac{(x+3)^2}{16} = 1$

D) $\frac{(x-4)^2}{16} + \frac{(y-3)^2}{25} = 1$

Find an equation in standard form for the hyperbola that satisfies the given conditions.

33) Center $(1, -3)$, focus $(6, -3)$, vertex $(5, -3)$

33) D

A) $\frac{(x-1)^2}{16} - \frac{(y+3)^2}{25} = 1$

B) $\frac{(x-1)^2}{9} - \frac{(y+3)^2}{16} = 1$

C) $\frac{(x+1)^2}{16} - \frac{(y+3)^2}{9} = 1$

D) $\frac{(x-1)^2}{16} - \frac{(y+3)^2}{9} = 1$

Expand the binomial.

34) $(3x + 4y)^4$

34) B

A) $81x^4 + 432x^3y - 864x^2y^2 + 768xy^3 - 256y^4$

B) $81x^4 + 432x^3y + 864x^2y^2 + 768xy^3 + 256y^4$

C) $81x^4 + 6912x^3y + 5184x^2y^2 + 768xy^3 + 256y^4$

D) $81x^4 + 6912x^3y - 5184x^2y^2 + 768xy^3 - 256y^4$

Find an explicit rule for the n th term of the arithmetic sequence.

35) $-13, -19, -25, -31, \dots$

35) C

A) $a_n = -13 + (-6)(n-1)$

B) $a_n = -13 + (-6)(n+1)$

C) $a_n = -13 + (-6)(n-1)$

D) $a_n = -13 - (-6)(n+1)$

36) $a_9 = 45, a_{10} = 6$

36) D

A) $a_n = 357 + 39(n+1)$

B) $a_n = 357 + 39(n-1)$

C) $a_n = 357 - 39(n+1)$

D) $a_n = 357 - 39(n-1)$

Find an explicit rule for the n th term of the sequence.

37) The second and fifth terms of a geometric sequence are -24 and 1536 , respectively.

37) C

A) $a_n = 6 \cdot 4^n$

B) $a_n = 6 \cdot 4^{n-1}$

C) $a_n = 6 \cdot (-4)^{n-1}$

D) $a_n = 6 \cdot (-4)^{n+1}$

Write the series using summation notation.

38) $9 - 27 + 81 - 243 + \dots$

38) B

A) $\sum_{n=0}^{\infty} 9 \cdot 3^{n+1}$

B) $\sum_{n=0}^{\infty} 9(-3)^n$

C) $\sum_{n=0}^{\infty} 9 \cdot 3^n$

D) $\sum_{n=0}^{\infty} 9(-3)^{n+1}$

Find the sum of the arithmetic series.

39) $247 + 245 + 243 + 241 + \dots + 229$

39) D

A) 227

B) 2461

C) 2580

D) 2380

Find the sum of the geometric series.

40) $\frac{4}{3} + \frac{16}{3} + \frac{64}{3} + \frac{256}{3} + \frac{1024}{3}$

A) $\frac{1360}{3}$

B) $\frac{1364}{15}$

C) $\frac{1364}{3}$

D) $\frac{272}{3}$

40) C

Find the sum of the first n terms of the sequence.

41) $5 + 2 - 1 - 4 + \dots ; n = 11$

A) $-\frac{253}{2}$

B) -110

C) -138

D) $-\frac{275}{2}$

41) B

Find the sum.

42)

$$\sum_{k=1}^n (k^2 + 30)$$

A) $\frac{n(n+1)(2n+1) + 6n}{6}$

B) $\frac{n(n+1)(2n+1)}{6}$

C) $\frac{n(n+1)(2n+1) + 180n}{6}$

D) $\frac{n(n+1)(2n+1) + 180n}{6}$

42) D

Write a linear factorization of the function. (Factor the given function completely.)

43) $f(x) = x^3 + 2x^2 + 2x - 5$

A) $f(x) = (x + 1)(2x + 3 + \sqrt{7}i)(2x + 3 - \sqrt{7}i)$

B) $f(x) = (x + 1)(2x + 3 + \sqrt{11}i)(2x + 3 - \sqrt{11}i)$

C) $f(x) = (x - 1)(x + 3 + \sqrt{11}i)(x + 3 - \sqrt{11}i)$

D) $f(x) = (x - 1)(2x + 3 + \sqrt{11}i)(2x + 3 - \sqrt{11}i)$

43) D

Find all rational zeros and factor f(x).

44) $f(x) = x^3 - 6x^2 + 3x + 10$

A) $2, 5, -1; f(x) = (x - 2)(x - 5)(x + 1)$

B) $3, 6, -1; f(x) = (x - 3)(x - 6)(x + 1)$

C) $-3, -6, 1; f(x) = (x + 3)(x + 6)(x - 1)$

D) $-2, -5, 1; f(x) = (x + 2)(x + 5)(x - 1)$

44) A

Determine which of the rational functions given below has the following feature(s).

45) There is a "hole" in its graph at $x = 4$

A) $f(x) = \frac{4x - 1}{x + 9}$

B) $f(x) = \frac{(x - 4)(x + 9)}{(x + 5)(x - 4)}$

C) $f(x) = \frac{x + 9}{x - 4}$

D) $f(x) = \frac{x + 4}{(x + 9)(x + 4)}$

45) C

46) x-intercepts: -5 and -1 , y-intercepts: $\frac{5}{16}$, vertical asymptote: $x = 4$, horizontal asymptote: $y = 1$

A) $f(x) = \frac{(x + 5)(x + 1)}{(x - 4)^2}$

B) $f(x) = \frac{(x - 5)(x - 1)}{(x + 4)^2}$

C) $f(x) = \frac{(x + 5)(x + 1)}{(x - 4)}$

D) $f(x) = \frac{(x - 5)(x - 1)}{(x + 4)}$

46) A

Solve the problem.

- 47) As one approaches a certain sound source, the sound intensity in arbitrary units increases according to the following function of time:

$$F(x) = -\frac{2(x-4)^2 + 2(x-4) - 9}{2(x-4) + 40}.$$

Starting at $x = 0$, when the source of sound is first sensed, how much time elapses until maximum sound intensity is felt? Round the result to the nearest hundredth.

- A) 35.38 sec. B) 19.69 sec. C) 3.38 sec. D) 0.24 sec.

47) C

Find the domain and range of the inverse of the given function.

48) $f(x) = \sqrt[3]{3x-2}$

- A) Domain: $[2, \infty)$; range: $[0, \infty)$ B) Domain: all real numbers; range: $[0, \infty)$
 C) Domain and range: all real numbers D) Domain: $[0, \infty)$; range: all real numbers

48) C

Solve the equation.

49) $\left(\frac{1}{3}\right)^{3x+6} = 9x-5$

- A) $\left\{-\frac{1}{4}\right\}$ B) $\left\{\frac{16}{3}\right\}$ C) $\left\{\frac{4}{5}\right\}$ D) $\left\{-\frac{1}{5}\right\}$

49) C

50) $e^x - 1 = \left(\frac{1}{e^5}\right)^{x+4}$

- A) $\left\{-\frac{19}{6}\right\}$ B) $\left\{\frac{5}{6}\right\}$ C) $\left\{-\frac{21}{4}\right\}$ D) $\left\{-\frac{5}{4}\right\}$

50) A

Solve the problem.

- 51) In September 1998 the population of the country of West Goma in millions was modeled by $f(x) = 17.4e^{0.0014x}$. At the same time the population of East Goma in millions was modeled by $g(x) = 14.9e^{0.0185x}$. In both formulas x is the number of years since September 1998. Assuming these trends continue, estimate the year when the population of West Goma will equal the population of East Goma.

- A) 1989 B) 2007 C) 2006 D) 9

51) B

Solve the equation.

52) $x = \log_4 \sqrt[4]{16}$

- A) $\{8\}$ B) $\left\{\frac{1}{2}\right\}$ C) $\left\{-\frac{1}{2}\right\}$ D) $\{2\}$

52) B

Write the expression as a sum, difference, or product of logarithms. Assume that all variables represent positive real numbers.

53) $\log_b \sqrt[3]{\frac{x^8}{y^7 z^9}}$ 53) D

A) $8\log_b x - 7\log_b y - 9\log_b z$ B) $\frac{8}{3}\log_b x \div (\frac{7}{3}\log_b y \cdot 3\log_b z)$

C) $\frac{1}{3}\log_b x^8 - \log_b y^7 - \log_b z^9$ D) $\frac{8}{3}\log_b x - \frac{7}{3}\log_b y - 3\log_b z$

Use the product, quotient, and power rules of logarithms to rewrite the expression as a single logarithm. Assume that all variables represent positive real numbers.

54) $\frac{1}{2} \log_2 (x^4) + \frac{1}{4} \log_2 (x^4) - \frac{1}{6} \log_2 x$ 54) A

A) $\log_2 (x^{17/6})$ B) $\frac{7}{6} \log_2 (x^8)$ C) $\log_2 (x^{9/2})$ D) $\log_2 (x^7)$

Given $\log_{10} 2 = 0.3010$ and $\log_{10} 3 = 0.4771$, find the logarithm without using a calculator.

55) $\log_{10} \frac{9}{8}$ 55) C

A) 0.8293 B) 0.1992 C) 0.0512 D) 2.0333

Solve the problem.

- 56) How long will it take a sample of radioactive substance to decay to half of its original amount, if it decays according to the function $A(t) = 800e^{-.207t}$, where t is the time in years? Round your answer to the nearest hundredth year. 56) A
- A) 3.35 years B) 32.29 years C) 35.64 years D) 165.60 years
- 57) An artifact is discovered at a certain site. If it has 52% of the carbon-14 it originally contained, what is the approximate age of the artifact to the nearest year? (carbon-14 decays at the rate of 0.0125% annually.) 57) A
- A) 5231 years B) 2272 years C) 3840 years D) 4160 years
- 58) Coffee is best enjoyed at a temperature of 115° F. A restaurant owner wants to discover the temperature T at which he should serve his coffee so that it will have cooled to this ideal temperature in 4 minutes. He discovers that a cup of coffee served at 199° F cools to 181° F in one minute when his restaurant is at 74° F. If he maintains the restaurant temperature at 74° F, at what temperature should he serve the coffee to meet his goal? 58) B
- A) 170° F B) 150° F C) 199° F D) 145° F

Solve the system.

59) $\frac{5}{x} + \frac{1}{y} = -\frac{31}{72}$ 59) B

$\frac{5}{x} - \frac{1}{y} = -\frac{49}{72}$

A) $\{(8, -9)\}$ B) $\{(-9, 8)\}$ C) $\{(9, -8)\}$ D) $\{(5, 5)\}$

Find the partial fraction decomposition for the rational expression.

$$60) \frac{7x^2 - 67x + 14}{(x^2 + 2x - 7)(x - 7)}$$

60) D

A) $\frac{2x}{x^2 + 2x - 7} + \frac{-9}{x - 7}$

B) $\frac{9x}{x^2 + 2x - 7} + \frac{2}{x - 7}$

C) $\frac{9x}{x - 7} + \frac{-2}{x^2 + 2x - 7}$

D) $\frac{9x}{x^2 + 2x - 7} + \frac{-2}{x - 7}$

Give all solutions of the nonlinear system of equations, including those with nonreal complex components.

$$61) x^2 + 3xy + y^2 = 4$$

61) C

$$x^2 - 3xy - y^2 = 4$$

A) $\{(2, 0), (-2, 0)\}$

B) $\{(0, 2), (0, -2), (2, -6), (-2, 6)\}$

C) $\{(2, 0), (-2, 0), (2, -6), (-2, 6)\}$

D) $\{(2, -6), (-2, 6)\}$

$$62) xy = 7$$

62) D

$$2y^2 - x^2 = 7$$

A) $\left\{ \left(-14, -\frac{1}{2} \right), (7, 1) \right\}$

B) $\left\{ (2i\sqrt{7}, -i\sqrt{7}), (-2i\sqrt{7}, i\sqrt{7}), (\sqrt{7}, \sqrt{7}), (-\sqrt{7}, -\sqrt{7}) \right\}$

C) $\left\{ \left(i\sqrt{14}, -\frac{i\sqrt{14}}{2} \right), (\sqrt{7}, \sqrt{7}) \right\}$

D) $\left\{ \left(i\sqrt{14}, -\frac{i\sqrt{14}}{2} \right), \left(-i\sqrt{14}, \frac{i\sqrt{14}}{2} \right), (\sqrt{7}, \sqrt{7}), (-\sqrt{7}, -\sqrt{7}) \right\}$

Find the indicated matrix.

$$63) \text{ Let } A = \begin{bmatrix} 1 & 3 \\ 2 & 5 \end{bmatrix} \text{ and } B = \begin{bmatrix} 0 & 4 \\ -1 & 6 \end{bmatrix}. \text{ Find } 4A + B.$$

63) B

A) $\begin{bmatrix} 4 & 16 \\ 1 & 11 \end{bmatrix}$

B) $\begin{bmatrix} 4 & 16 \\ 7 & 26 \end{bmatrix}$

C) $\begin{bmatrix} 4 & 28 \\ 4 & 44 \end{bmatrix}$

D) $\begin{bmatrix} 4 & 7 \\ 7 & 11 \end{bmatrix}$

Solve the problem.

$$64) \text{ Given } A = \begin{bmatrix} 0 & -1 & 0 \\ 0 & 1 & -1 \\ -1 & 0 & -1 \end{bmatrix} \text{ and } B = \begin{bmatrix} -1 & 1 & 0 \\ 0 & -1 & 0 \\ 1 & 1 & 0 \end{bmatrix}, \text{ find } AB \text{ and } BA.$$

64) D

A) $AB = \begin{bmatrix} 0 & -1 & 0 \\ 0 & -1 & 0 \\ -1 & 0 & 0 \end{bmatrix}; BA = \begin{bmatrix} 0 & -1 & 0 \\ 0 & -1 & 0 \\ -1 & 0 & 0 \end{bmatrix}$

B) $AB = \begin{bmatrix} 0 & 2 & -1 \\ 0 & -1 & 1 \\ 0 & 0 & -1 \end{bmatrix}; BA = \begin{bmatrix} 0 & 1 & 0 \\ -1 & -2 & 0 \\ 0 & -2 & 0 \end{bmatrix}$

C) $AB = \begin{bmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & -2 & 0 \end{bmatrix}; BA = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & -1 \\ 0 & -2 & 1 \end{bmatrix}$

D) $AB = \begin{bmatrix} 0 & 1 & 0 \\ -1 & -2 & 0 \\ 0 & -2 & 0 \end{bmatrix}; BA = \begin{bmatrix} 0 & 2 & -1 \\ 0 & -1 & 1 \\ 0 & 0 & -1 \end{bmatrix}$

Find the inverse, if it exists, for the matrix.

65) $\begin{bmatrix} 1 & -4 \\ -3 & -4 \end{bmatrix}$

65) A

A)

$$\begin{bmatrix} \frac{1}{4} & -\frac{1}{4} \\ -\frac{3}{16} & -\frac{1}{16} \end{bmatrix}$$

B)

$$\begin{bmatrix} -\frac{1}{16} & -\frac{1}{4} \\ -\frac{3}{16} & \frac{1}{4} \end{bmatrix}$$

C)

$$\begin{bmatrix} -\frac{3}{16} & -\frac{1}{16} \\ \frac{1}{4} & -\frac{1}{4} \end{bmatrix}$$

D)

$$\begin{bmatrix} \frac{1}{4} & \frac{1}{4} \\ \frac{3}{16} & -\frac{1}{16} \end{bmatrix}$$

66) $\begin{bmatrix} 0 & 2 & 2 \\ -4 & 0 & 7 \\ 0 & 2 & 0 \end{bmatrix}$

66) C

A)

$$\begin{bmatrix} -\frac{7}{8} & -\frac{1}{4} & -\frac{7}{8} \\ -\frac{1}{2} & 0 & \frac{1}{2} \\ \frac{1}{2} & 0 & 0 \end{bmatrix}$$

B)

$$\begin{bmatrix} \frac{7}{8} & 0 & \frac{1}{2} \\ -\frac{1}{4} & 0 & 0 \\ -\frac{7}{8} & \frac{1}{2} & -\frac{1}{2} \end{bmatrix}$$

C)

$$\begin{bmatrix} \frac{7}{8} & -\frac{1}{4} & -\frac{7}{8} \\ 0 & 0 & \frac{1}{2} \\ \frac{1}{2} & 0 & -\frac{1}{2} \end{bmatrix}$$

D) The inverse does not exist.

$$67) \begin{bmatrix} 6 & -2 & 5 & -2 \\ 6 & -1 & -2 & -1 \\ 12 & -3 & 3 & -3 \\ 0 & -4 & 10 & 0 \end{bmatrix}$$

67) D

A)

$$\begin{bmatrix} 1 & 0 & 0 & -\frac{1}{3} \\ 0 & 1 & 0 & -\frac{5}{9} \\ 0 & 0 & 1 & -\frac{2}{9} \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

B)

$$\begin{bmatrix} \frac{1}{6} & -\frac{1}{2} & \frac{1}{5} & -\frac{1}{2} \\ \frac{1}{6} & -1 & -2 & -1 \\ \frac{1}{12} & -\frac{1}{3} & \frac{1}{3} & -\frac{1}{3} \\ 0 & -\frac{1}{4} & \frac{1}{10} & 0 \end{bmatrix}$$

D) The inverse does not exist.

C)

$$\begin{bmatrix} \frac{1}{6} & -\frac{1}{2} & \frac{1}{5} & -\frac{1}{2} \\ \frac{1}{6} & -1 & -\frac{1}{2} & -1 \\ \frac{1}{12} & -\frac{1}{3} & \frac{1}{3} & -\frac{1}{3} \\ 0 & -\frac{1}{4} & \frac{1}{10} & 0 \end{bmatrix}$$

Solve the problem.

68) A basketball fieldhouse seats 15,000. Courtside seats sell for \$10, endzone for \$7, and balcony for \$4. Total revenue for a sell-out is \$84,000. If half the courtside and balcony and all the endzone seats are sold, the total revenue is \$49,000. How many of each type of seat are there in the fieldhouse?

68) B

- A) 3,200 courtside; 1,800 endzone; 10,000 balcony
- B) 3,000 courtside; 2,000 endzone; 10,000 balcony
- C) 4,000 courtside; 3,000 endzone; 8,000 balcony
- D) 2,000 courtside; 5,000 endzone; 8,000 balcony

Perform the operation or operations when possible.

$$69) \begin{bmatrix} 9x + 8y \\ 8k - 7z \\ -8w + 7v \\ 4m - 6n \end{bmatrix} - \begin{bmatrix} -4x - 6y \\ -4k - 4z \\ -4w + 9v \\ 8m - 8n \end{bmatrix}$$

69) C

A)

$$\begin{bmatrix} 5x + 2y \\ 4k - 11z \\ -12w + 16v \\ 12m - 14n \end{bmatrix}$$

B)

$$\begin{bmatrix} 5x + 14y \\ 4k - 3z \\ -12w - 2v \\ 12m + 2n \end{bmatrix}$$

C)

$$\begin{bmatrix} 13x + 14y \\ 12k - 3z \\ -4w - 2v \\ -4m + 2n \end{bmatrix}$$

D)

$$\begin{bmatrix} 13x + 2y \\ 12k - 11z \\ -4w + 16v \\ -4m - 14n \end{bmatrix}$$

Solve the problem.

- 70) A bookstore is having a sale. All books included in the sale have a colored sticker on them to indicate the sale price. There are green stickers, red stickers, and orange stickers. Bob, Sue, and Fred each make purchases of books that are on sale. Each row of the table gives information about the numbers of book purchases and the total cost of the purchase (before taxes).

70) A

Person	Green	Red	Orange	Total Cost
Bob	1	2	2	\$30.44
Sue	1	3	2	\$37.31
Fred	1	2	3	\$36.31

Use this information to set up a matrix equation of the form $AX = B$, which can be solved to determine the price for each type of sale book. Solve this matrix equation to find the price of a book with a red sticker.

Use the fact that for $A = \begin{bmatrix} 1 & 2 & 2 \\ 1 & 3 & 2 \\ 1 & 2 & 3 \end{bmatrix}$, $A^{-1} = \begin{bmatrix} 5 & -2 & -2 \\ -1 & 1 & 0 \\ -1 & 0 & 1 \end{bmatrix}$.

A) \$6.87

B) \$6.50

C) \$6.99

D) \$6.79