Math 115 Summer Math Assignment 2022

Name_____

Show all of your work on paper. Number problems and circle answers.
Submit on the first day of school to your teacher or Ms. Baker.

Determine whether the relation is a function.

1) {(–2, 7), (2, –1), (6, 3), (9, –8), (10, –1)} 1) _____

A) Function B) Not a function

Is the following correspondence a function?

2) Domain: All students attending Laughlin Community College 2) _____
Correspondence: Each student's Social Security Number
Range: A set of Social Security Numbers

A) Yes B) No

3) Domain: All students attending the University of Ohio 3) _____
Correspondence: Each student's teachers
Range: A set of teachers

A) Yes B) No

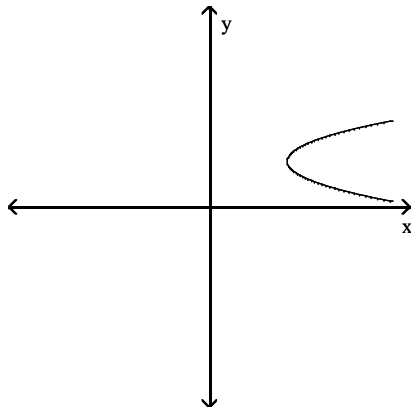
Determine whether the equation defines y as a function of x.

4) $x^2 + y^2 = 81$ 4) _____

A) y is a function of x B) y is not a function of x

Use the vertical line test to determine whether or not the graph is a graph in which y is a function of x.

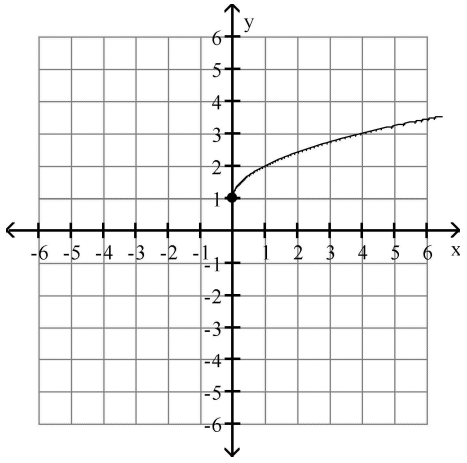
5) 5) _____



A) not a function B) function

Use the graph to determine the function's domain and range.

6) 6) _____



A) domain: [0, ∞)
range: [0, ∞)

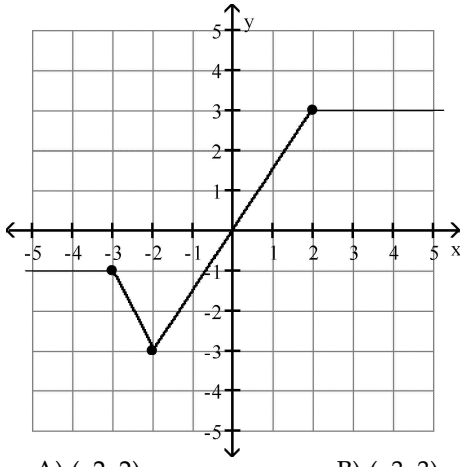
B) domain: [0, ∞)
range: (−∞, ∞)

C) domain: [0, ∞)
range: [1, ∞)

D) domain: (−∞, ∞)
range: [1, ∞)

Identify the intervals where the function is changing as requested.

7) Increasing 7) _____



A) (−2, 2)

B) (−3, 3)

C) (−3, ∞)

D) (−2, ∞)

Find the domain of the function.

8) $f(x) = \sqrt{x - 1}$ 8) _____

A) all real numbers, or (−∞, ∞)

B) {x | x ≠ 1}, or (−∞, 1) ∪ (1, ∞)

C) {x | x ≥ 1}, or [1, ∞)

D) {x | x ≥ −1}, or [−1, ∞)

9) $f(x) = \dfrac{8x}{\sqrt{5 + x}}$ 9) _____

A) {x | x < 5}, or (-∞, 5)

B) {x | x > 5}, or (5, ∞)

C) {x | x < −5}, or (-∞, −5)

D) {x | x > −5}, or (−5, ∞)

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

10) $f(x) = 5x^2$ 10) _____

A) $5(2x+h)$

B) $\frac{10}{h} + x + 5h$

C) 5

D) $\frac{5(2x^2 + 2xh + h^2)}{h}$

Solve and write interval notation for the solution set.

11) $|17x + 7| < 0$ 11) _____

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

B) No solution

C) $\left(-\infty, -\frac{7}{17}\right) \cup \left(\frac{7}{17}, \infty\right)$

D) $-\frac{7}{17}$

12) $|6x + 3| < 3$ 12) _____

A) $(-1, 0)$ B) $(-\infty, 6)$ C) $(-\infty, -1) \cup (0, \infty)$ D) $(-\infty, -1)$

13) $|5x - 1| \geq 7$ 13) _____

A) $\left(-\infty, -\frac{6}{5}\right] \cup \left[\frac{8}{5}, \infty\right)$

B) $\left[\frac{8}{5}, \infty\right)$

C) $\left[-\frac{6}{5}, \frac{8}{5}\right]$

D) $\left(-\infty, -\frac{8}{5}\right] \cup [7, \infty)$

14) $|3x - 5| > -8$ 14) _____

A) $\left(-\infty, \frac{5}{3}\right) \cup \left(-\frac{11}{3}, \infty\right)$

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

C) $\left(-\infty, \frac{13}{3}\right) \cup (-1, \infty)$

D) No solution

For the pair of functions, find the indicated domain.

15) $f(x) = \frac{7}{x+1}$, $g(x) = x + 7$ 15) _____

Find the domain of $f \circ g$.

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

B) $(-\infty, -8] \cup [-8, \infty)$

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

D) $(-\infty, -8) \cup (-8, \infty)$

16) $f(x) = 2x - 5$, $g(x) = \sqrt{x+2}$ 16) _____

Find the domain of $g \circ f$.

A) $[2, \infty)$ B) $(-2, 2)$ C) $[-\infty, 1.5)$ D) $[1.5, \infty)$

For the pair of functions, find the indicated composition.

17) $f(x) = x^3 - 9x^2 - 9x + 5$, $g(x) = x - 1$ 17) _____

Find $(f \circ g)(x)$.

A) $x^3 - 9x^2 - 9x + 6$

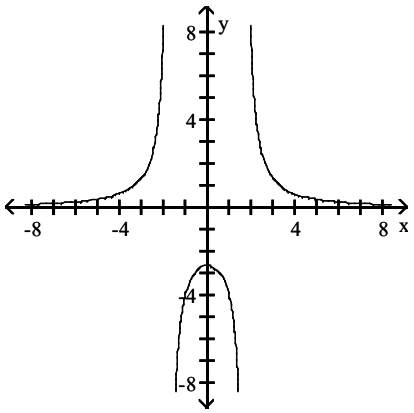
B) $x^3 - 9x^2 - 9x + 4$

C) $x^3 - 6x^2 - 24x - 12$

D) $x^3 - 12x^2 + 12x + 4$

Using the horizontal–line test, determine whether the function is one–to–one.

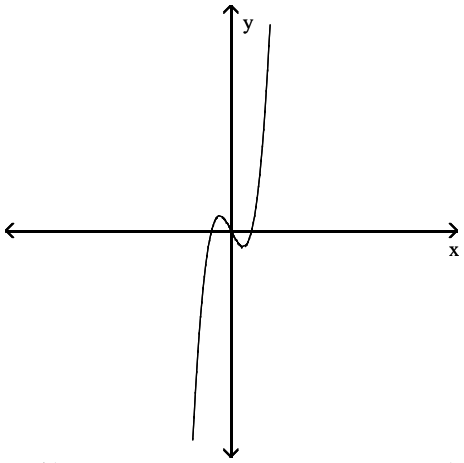
18) $f(x) = \dfrac{8}{x^2 - 3}$ 18) _____



A) Yes B) No

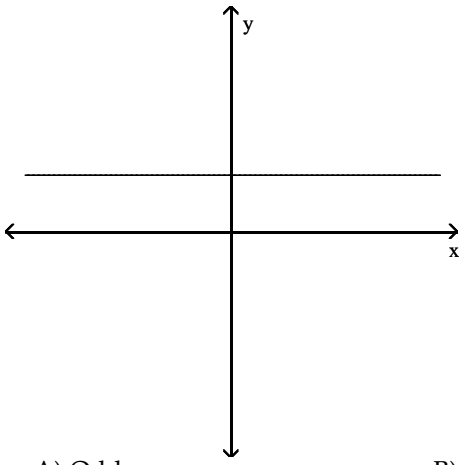
Determine whether the given function is even, odd, or neither even nor odd.

19) 19) _____



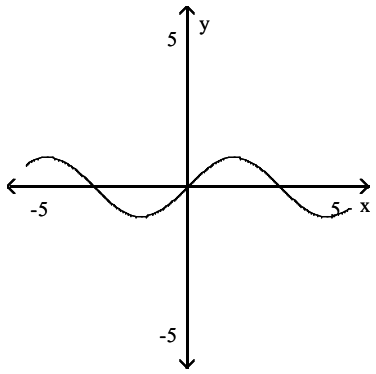
A) Even B) Neither C) Odd

20) 20) _____



A) Odd B) Even C) Neither

Determine if the graph is symmetric with respect to x–axis, y–axis, and/or the origin.

21) 

21) _____

A) no symmetry B) origin C) y–axis D) x–axis

Determine algebraically whether the graph is symmetric with respect to the x–axis, the y–axis, and the origin.

22) $y = 4x^2 - 4$ 22) _____

A) x–axis, y–axis, origin B) y–axis only
C) Origin only D) x–axis only

Determine algebraically whether the function is even, odd, or neither even nor odd.

23) $f(x) = 5x^2 - 1$ 23) _____

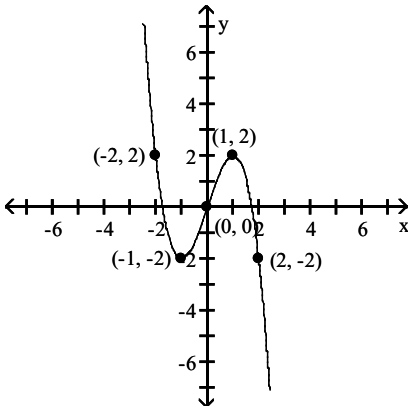
A) Even B) Odd C) Neither

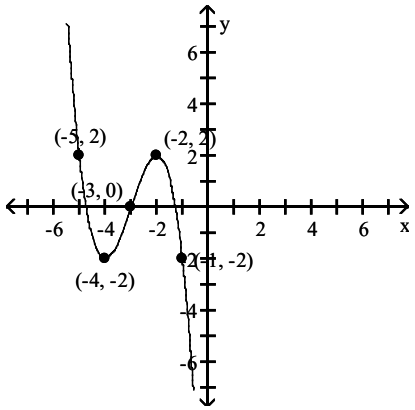
24) $f(x) = -3x^4 + 5x - 3$ 24) _____

A) Even B) Odd C) Neither

Given the graph of the function $f(x) = -x^3 + 3x$; find a formula for g(x) .

25) $f(x) = -x^3 + 3x$ $g(x) =$ 25) _____





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

Solve the problem.

26) The length of a rectangle is three inches more than the width. The area of the rectangle is 418 inches. Find the width of the rectangle. 26) _____

A) 19 in. B) 10 in. C) 11 in. D) 22 in.

Simplify. Write your answers in the form of a+bi, where a and b are real numbers.

27) $(7 + 3i)^2$ 27) _____

A) $58 - 42i$ B) $40 + 42i$ C) $40 - 42i$ D) $58 + 42i$

28) $\frac{\sqrt{7} + 6i}{5 - 2i}$ 28) _____

A) $\frac{-12 + 5\sqrt{7}}{29} + \frac{30 + 2\sqrt{7}}{29}\,i$ B) $\frac{-12 + 5\sqrt{7}}{29} - \frac{30 + 2\sqrt{7}}{29}\,i$

C) $\frac{30 + 2\sqrt{7}}{29}\,i$ D) $\frac{-12 + 5\sqrt{7}}{29}$

Simplify.

29) i^{13} 29) _____

A) i B) -1 C) $-i$ D) 1

Solve by factoring/taking square roots or using Quadratic Formula. Show all steps.

30) $x^2 + 8x + 16 = 11$ 30) _____

A) 7 B) $4 + \sqrt{11}, 4 - \sqrt{11}$

C) $\sqrt{11}, -\sqrt{11}$ D) $-4 + \sqrt{11}, -4 - \sqrt{11}$

31) $x^2 - 14x + 13 = 0$ 31) _____

A) $12, 1$ B) $-13, -1$ C) $\sqrt{13}, -\sqrt{13}$ D) $13, 1$

32) $49x^2 - 14x - 8 = 0$ 32) _____

A) $-\frac{4}{7}, \frac{2}{7}$ B) $-\frac{2}{49}, -\frac{6}{49}$ C) $\frac{4}{7}, -\frac{2}{7}$ D) $\frac{4}{49}, -\frac{2}{49}$

Use the quadratic formula to find the exact solutions.

33) $x^2 - 12x + 40 = 0$ 33) _____

A) $6 \pm 2i$ B) $-6 \pm 2i$ C) $12 \pm 4i$ D) $8, 4$

34) $3x^2 - 14x - 5 = 0$ 34) _____

A) $-\frac{1}{5}, 3$ B) $-\frac{1}{5}, -3$ C) $-\frac{1}{3}, 5$ D) $-3, 5$

Solve.

35) $z^4 - 8z^2 + 12 = 0$ 35) _____

A) $\sqrt{-2}, \sqrt{-6}$ B) $\pm\sqrt{2}, \pm\sqrt{6}$ C) $\sqrt{-2}, \sqrt{6}$ D) $\sqrt{2}, \sqrt{6}$

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

36) $f(x) = -\frac{1}{3}x^2 + 5x - 6$ 36) _____

A) Minimum: $-\frac{249}{4}$ B) Maximum: $\frac{51}{4}$

C) Minimum: $\frac{51}{4}$ D) Maximum: -6

Solve the problem.

37) You have 300 feet of fencing to enclose a rectangular region. Find the dimensions of the rectangle that maximize the enclosed area. 37) _____

A) 75 ft by 75 ft B) 150 ft by 37.5 ft C) 150 ft by 150 ft D) 77 ft by 73 ft

38) You have 120 feet of fencing to enclose a rectangular plot that borders on a river. If you do not fence the side along the river, find the length and width of the plot that will maximize the area. 38) _____

A) length: 60 feet, width: 30 feet B) length: 60 feet, width: 60 feet
C) length: 90 feet, width: 30 feet D) length: 30 feet, width: 30 feet

39) Among all pairs of numbers whose difference is 26, find a pair whose product is as small as possible. 39) _____

A) –13 and 13 B) 13 and 13 C) 39 and 13 D) –39 and –13

40) An arrow is fired into the air with an initial velocity of 160 feet per second. The height in feet of the arrow t seconds after it was shot into the air is given by the function $h(x) = -16t^2 + 160t$. Find the maximum height of the arrow. 40) _____

A) 720 ft B) 1200 ft C) 80 ft D) 400 ft

41) A person standing close to the edge on top of a 144–foot building throws a baseball vertically upward. The quadratic function $s(t) = -16t^2 + 64t + 144$ models the ball's height above the ground, s(t), in feet, t seconds after it was thrown. After how many seconds does the ball reach its maximum height? Round to the nearest tenth of a second if necessary. 41) _____

A) 2 seconds B) 5.6 seconds C) 1.5 seconds D) 208 seconds

Find the range of the given function.

42) $f(x) = -5x^2 + 30x - 40$ 42) _____

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

Factor the difference of squares.

43) $49s^5 - 36st^4$ 43) _____

A) $s(7s^2 + 6t^2)(s + t)(s - t)$ B) $(7s^2 + 6st^2)(7s^2 - 6st^2)$
C) $s(7s^2 + 6t^2)(7s^2 - 6t^2)$ D) $49s(s^2 + t^2)(s + t)(s - t)$

Factor the square of the binomial.

44) $4x^2 + 12x + 9$ 44) _____

A) $(2x + 3)(2x - 3)$ B) $(2x + 9)^2$ C) $(2x + 3)^2$ D) $(2x - 3)^2$

45) $x^2 + 18xy + 81y^2$ 45) _____

A) $(x + 9y)(x - 9y)$ B) $(x + 9y)^2$
C) $(x + 18y)(x - 18y)$ D) $(x - 9y)^2$

Factor by grouping. Assume any variable exponents represent whole numbers.

46) $3x^3 - 15x^2 + 7x - 35$ 46) _____

A) $(x - 5)(3x + 7)$ B) $(x - 5)(3x^2 - 7)$ C) $(x + 5)(3x^2 + 7)$ D) $(x - 5)(3x^2 + 7)$

Factor the sum or difference of cubes.

47) $t^3 + 8$ 47) _____

A) $(t + 2)(t^2 - 2t + 4)$ B) $(t - 2)(t^2 + 2t + 4)$

C) $(t - 8)(t^2 - 1)$ D) $(t + 2)(t^2 + 4)$

Use synthetic division to find the quotient and the remainder.

48) $(2x^5 - x^4 + 3x^2 - x + 5) \div (x - 1)$ 48) _____

A) $Q(x) = (2x^4 - 3x^3 - x)$; $R(x) = 6$ B) $Q(x) = (2x^4 + x^3 + x^2 + 4x + 3)$; $R(x) = 8$

C) $Q(x) = (2x^4 + x^3 - x^2 + 2x + 1)$; $R(x) = 6$ D) $Q(x) = (2x^4 + x^3 + 4x^2 + 3x)$; $R(x) = 8$

Solve the polynomial equation. In order to obtain the first root, use synthetic division to test the possible rational roots.

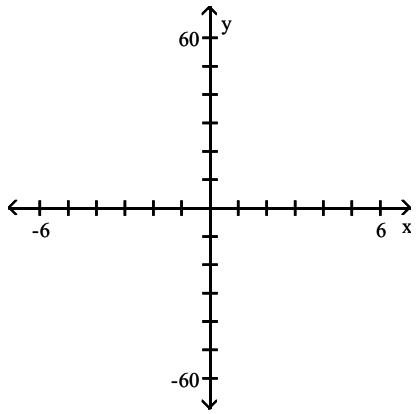
49) $2x^4 - 15x^3 + 57x^2 - 103x + 39 = 0$ 49) _____

A) $\{-3, \frac{1}{2}, 2 + 3i, 2 - 3i\}$ B) $\{-3, -\frac{1}{2}, 3 + 2i, 3 - 2i\}$

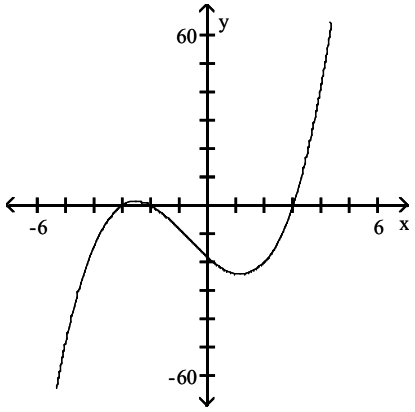
C) $\{3, -\frac{1}{2}, 3 + 2i, 3 - 2i\}$ D) $\{3, \frac{1}{2}, 2 + 3i, 2 - 3i\}$

Graph the polynomial function. Use synthetic division and the remainder theorem to find the zeros.

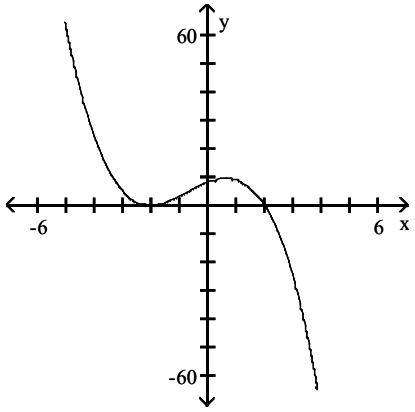
50) $f(x) = x^3 + 4x^2 - 3x - 18$ 50) _____



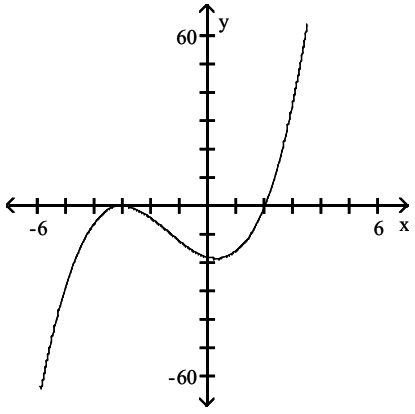
A) –3, 3, 2;



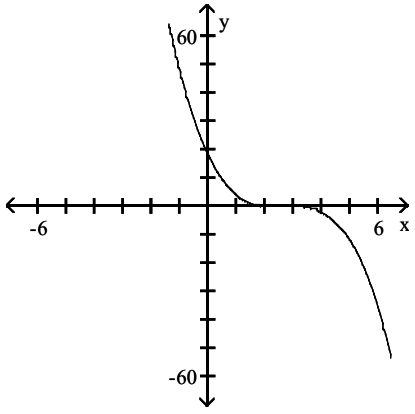
B) –2 (multiplicity 2), 2;



C) –3 (multiplicity 2), 2;



D) 3 (multiplicity 2), 2;



Find the requested polynomial.

51) Find a polynomial function of degree 3 with 2, 2i, –2i as zeros. 51) _____

A) $f(x) = x^3 + 2x^2 + 4ix + 8i$

B) $f(x) = x^3 - 2x^2 - 4x + 8$

C) $f(x) = x^3 - 2x^2 + 4x - 8$

D) $f(x) = x^3 - 2ix^2 + 4x + 8$

Give all possible rational zeros for the polynomial.

52) $f(x) = 13x^{24} + 23x^{18} + 2x - 26$ 52) _____

A) $\pm 1, \pm\frac{1}{13}, \pm 2, \pm\frac{2}{13}, \pm 13, \pm 26$

B) $\pm 1, \pm\frac{1}{13}, \pm 2, \pm 13, \pm 26$

C) $\pm 1, \pm\frac{1}{2}, \pm 13, \pm\frac{13}{2}, \pm\frac{1}{13}, \pm\frac{1}{26}$

D) $\pm 1, \pm 2, \pm 13, \pm 26$

Solve.

53) $x^2 + 13x + 42 > 0$ 53) _____

A) $(-\infty, -7) \cup (-6, \infty)$

B) $(-6, \infty)$

C) $(-7, -6)$

D) $(-\infty, -7)$

54) $12x - 36 - x^2 < 0$ 54) _____

A) $(-\infty, 6) \cup (6, \infty)$ B) $(\infty, 6)$ C) $(6, \infty)$ D) $(-6, 6)$

55) $x^2 + 4x + 4 \le 0$ 55) _____

A) $[2, \infty)$

B) $(-\infty, -2] \cup [-2, \infty)$

C) $\{-2\}$

D) $\{2\}$

List the critical values of the related function. Then solve the inequality.

56) $\frac{x + 9}{x + 6} < 3$ 56) _____

A) $-6, -\frac{9}{2}; \left(-6, -\frac{9}{2}\right)$

B) $-6, -\frac{9}{2}; (-\infty, -6) \cup \left(-\frac{9}{2}, \infty\right)$

C) No critical values; $\varnothing$

D) $-\frac{9}{2}, 6; \left(-\infty, -\frac{9}{2}\right) \cup (6, \infty)$

Find the vertical asymptote(s) of the graph of the given function.

57) $f(x) = \frac{x^2 + 4x}{x^2 - 2x - 24}$ 57) _____

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

Find the horizontal asymptote, if any, of the rational function.

58) $f(x) = \frac{x + 5}{8x^2 + 4x - 9}$ 58) _____

A) $y = 0$ B) $y = \frac{1}{8}$ C) $y = 1$ D) None

59) $f(x) = \frac{x^2 + 5x + 5}{8 - x^2}$ 59) _____

A) $y = 0$ B) $y = -1$ C) $y = 1$ D) None

Find the oblique/slant asymptote, if any, of the rational function.

60) $f(x) = \dfrac{x^2 + 9x + 9}{x + 4}$ 60) _____

A) $y = x - 13$ B) $y = x + 5$ C) $x = y + 5$ D) None

61) $f(x) = \dfrac{x^3 - 9x^2 + 6x - 1}{x^2 + 3x}$ 61) _____

A) $y = x + 15$ B) $y = x - 12$ C) None D) $y = x$

Solve the rational equation.

62) $\dfrac{1}{x + 7} + \dfrac{2}{x + 3} = \dfrac{-4}{x^2 + 10x + 21}$ 62) _____

A) $\varnothing$ B) {0} C) {−7} D) {3}

Find the inverse of the function.

63) $f(x) = \dfrac{1}{7}x + 6$ 63) _____

A) $f^{-1}(x) = 7x + 42$ B) $f^{-1}(x) = 7x - 42$ C) $f^{-1}(x) = \dfrac{1}{6}x + 7$ D) $f^{-1}(x) = \dfrac{1}{7}x - 6$

64) $f(x) = \sqrt[3]{x - 1}$ 64) _____

A) $f^{-1}(x) = x^3 + 1$ B) $f^{-1}(x) = (x + 1)^3$ C) $f^{-1}(x) = (x - 1)^3$ D) $f^{-1}(x) = \sqrt[3]{x} - 1$

Express as a sum of logarithms.

65) $\log_x 3yz$ 65) _____

A) $\log_x (3 + y + z)$ B) $\log_3 y + \log_3 z$

C) $(\log_x 3)(\log_x y)(\log_x z)$ D) $\log_x 3 + \log_x y + \log_x z$

Express as a single logarithm and, if possible, simplify.

66) $\log_a 0.1 + \log_a 100$ 66) _____

A) $\log_a \dfrac{1}{1000}$ B) $0.1 \log_a 100$

C) $\log_a 0.1 \cdot \log_a 100$ D) $\log_a 10$

67) $\dfrac{1}{2}\ln x - \ln 3$ 67) _____

A) $\ln\left(\dfrac{x}{2} - 3\right)$ B) $\ln\left(\dfrac{\sqrt{x}}{3}\right)$ C) $\ln(\sqrt{x} - 3)$ D) $\ln\left(\sqrt{\dfrac{x}{3}}\right)$

68) $\frac{2}{7}\log_a x + \frac{1}{9}\log_a y$ 68) _____

A) $\log_a (x^{2/7} y^{1/9})$ B) $\log_a (xy^{2/63})$

C) $\frac{2}{63}\log_a xy$ D) $\log_a (x^{2/7} + y^{1/9})$

Use properties of logarithms to expand the logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator.

69) $\ln\left(\frac{e^4}{5}\right)$ 69) _____

A) $\ln e^4 - \ln 5$ B) $4 - \ln 5$ C) $\ln e^4 + \ln 5$ D) $4 + \ln 5$

70) $\log_2\left(\frac{8}{x}\right)$ 70) _____

A) $3 - \log_2 x$ B) $-3\log_2 x$ C) $\frac{3}{x}$ D) $6 - \log_2 x$

Use common logarithms or natural logarithms and a calculator to evaluate to four decimal places

71) $\log_\pi 24$ 71) _____

A) 0.8831 B) 0.3602 C) 1.8774 D) 2.7762

Solve the equation by expressing each side as a power of the same base and then equating exponents.

72) $3^{(6-3x)} = \frac{1}{27}$ 72) _____

A) {–3} B) {3} C) {9} D) $\left\{\frac{1}{9}\right\}$

73) $7^{(x-4)/8} = \sqrt{7}$ 73) _____

A) {12} B) $\left\{\frac{20}{3}\right\}$ C) {8} D) {20}

74) $e^{x+1} = \frac{1}{e^7}$ 74) _____

A) {6} B) {8} C) {–6} D) {–8}

Solve the exponential equation. Express the solution set in terms of natural logarithms.

75) $e^{3x} = 6$ 75) _____

A) {3 ln 6} B) $\{2e\}$ C) $\left\{\frac{\ln 6}{3}\right\}$ D) $\left\{\frac{\ln 3}{6}\right\}$

76) $4^{x+4} = 5^{2x+5}$ 76) _____

A) $\left\{\ln\left[\frac{5^5}{4^4} - \frac{4}{5^2}\right]\right\}$ B) $\{\ln 5 - \ln 4\}$

C) $\left\{\frac{5\ln 5 - 4\ln 4}{\ln 4 - 2\ln 5}\right\}$ D) $\{7\ln 5 - 5\ln 4\}$

Solve the exponential equation. Use a calculator to obtain a decimal approximation, correct to two decimal places, for the solution.

77) $e^{2x} + e^x - 6 = 0$ 77) _____

A) 1.10, 0.14 B) 0.14 C) 0.69, 1.10 D) 0.69

Solve the logarithmic equation. Be sure to reject any value that is not in the domain of the original logarithmic expressions. Give the exact answer.

78) $\log_3 (x + 1) = -2$ 78) _____

A) $\left\{\frac{10}{9}\right\}$ B) $\left\{-\frac{8}{9}\right\}$ C) $\left\{\frac{5}{4}\right\}$ D) $\{-1\}$

79) $9 \ln (9x) = 63$ 79) _____

A) $\left\{e^{7/9}\right\}$ B) $\left\{\frac{7}{\ln 9}\right\}$ C) $\left\{\frac{e^7}{9}\right\}$ D) $\{e^7\}$

80) $\log_6 5 + \log_6 x = 1$ 80) _____

A) $\{\frac{1}{5}\}$ B) $\{\frac{5}{6}\}$ C) $\{\frac{6}{5}\}$ D) $\{\sqrt[5]{6}\}$

81) $\log_2 x + \log_2 (x - 3) = 2$ 81) _____

A) {4} B) {–1, 4} C) {1, –4} D) {2}

82) $\log_4 (x + 5) + \log_4 (x - 1) = 2$ 82) _____

A) {4} B) {3, –7} C) {3} D) {–7}

83) $\log_8 (x + 2) - \log_8 x = 2$ 83) _____

A) $\{\frac{1}{32}\}$ B) {8} C) $\{\frac{63}{2}\}$ D) $\{\frac{2}{63}\}$

Solve.

84) The value of a particular investment follows a pattern of exponential growth. In the year 2000, you invested money in a money market account. The value of your investment t years after 2000 is given by the exponential growth model $A = 9500e^{0.054t}$. When will the account be worth \$11,790? 84) _____

A) 2004 B) 2006 C) 2005 D) 2003

85) An endangered species of fish has a population that is decreasing exponentially ($A = A_0e^{kt}$). The population 7 years ago was 1900. Today, only 900 of the fish are alive. Once the population drops below 100, the situation will be irreversible. When will this happen, according to the model? (Round to the nearest whole year.) 85) _____

A) 23 years from today
B) 21 years from today
C) 22 years from today
D) 20 years from today

Use Newton's Law of Cooling, $T = C + (T_0 - C)e^{kt}$, to solve the problem

86) A tub of ice cream initially has a temperature of 25°F. It is left to thaw in a room that has a temperature of 70°F. After 10 minutes, the temperature of the ice cream has risen to 35°F. After how many minutes will the temperature of the ice cream be 51°F? 86) _____

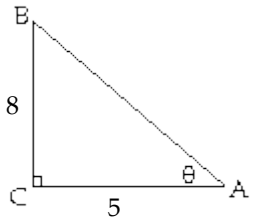
A) 38 min
B) 32 min
C) 28 min
D) 34 min

87) A cup of tea with temperature 102°F is placed in a freezer with temperature 0°F. After 5 minutes, the temperature of the tea is 66.7°F. After how many minutes will its temperature be 26°F? Round your answer to the nearest minute. 87) _____

A) 24 min
B) 14 min
C) 16 min
D) 21 min

Use the Pythagorean Theorem to find the length of the missing side.Then find the indicated trigonometric function of the given angle. Give an exact answer with a rational denominator.

88) Find sin θ. 88) _____



A) $\frac{\sqrt{89}}{5}$
B) $\frac{\sqrt{89}}{8}$
C) $\frac{5\sqrt{89}}{89}$
D) $\frac{8\sqrt{89}}{89}$

Solve the problem.

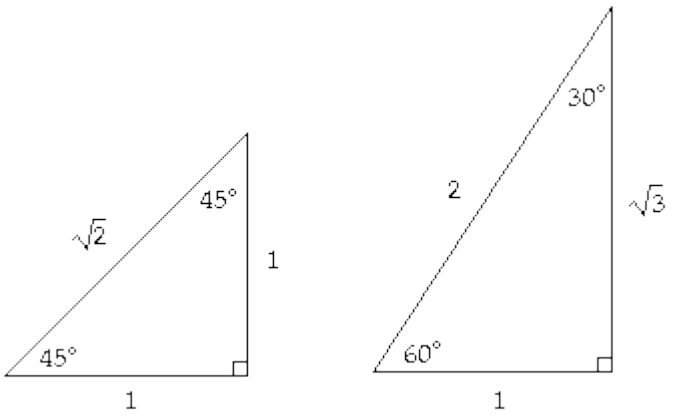
89) A radio transmission tower is 200 feet tall. How long should a guy wire be if it is to be attached 10 feet from the top and is to make an angle of 30° with the ground? Give your answer to the nearest tenth of a foot. 89) _____

A) 400.0 feet
B) 380.0 feet
C) 230.9 feet
D) 219.4 feet

90) A building 280 feet tall casts a 100 foot long shadow. If a person looks down from the top of the building, what is the measure of the angle between the end of the shadow and the vertical side of the building (to the nearest degree)? (Assume the person's eyes are level with the top of the building.) 90) _____

A) 69°
B) 20°
C) 70°
D) 21°

Use the given triangles to evaluate the expression. Rationalize all denominators.



91) $\tan\frac{\pi}{4}$ 91) _____

A) $\frac{\sqrt{2}}{2}$ B) $\sqrt{2}$ C) $\frac{\sqrt{3}}{2}$ D) 1

92) $\sin\frac{\pi}{6}$ 92) _____

A) $\frac{1}{2}$ B) $\frac{\sqrt{2}}{2}$ C) $\frac{\sqrt{3}}{2}$ D) $\frac{\sqrt{3}}{3}$

93) $\tan\frac{\pi}{6} - \cos\frac{\pi}{6}$ 93) _____

A) $-\frac{\sqrt{3}}{6}$ B) $-\frac{\sqrt{6}}{2}$ C) $\frac{2\sqrt{3}-3\sqrt{2}}{6}$ D) $\sqrt{3}$

The point P(x, y) on the unit circle that corresponds to a real number t is given. Find the value of the indicated trigonometric function at t.

94) $\left(-\frac{\sqrt{39}}{8}, -\frac{5}{8}\right)$ Find cot t. 94) _____

A) $\frac{\sqrt{39}}{5}$ B) $\frac{\sqrt{39}}{8}$ C) $-\frac{5\sqrt{39}}{39}$ D) $-\frac{\sqrt{39}}{5}$

Find a cofunction with the same value as the given expression.

95) $\sin\frac{\pi}{13}$ 95) _____

A) $\sin\frac{11\pi}{26}$ B) $\cos\frac{\pi}{13}$ C) $\cos\frac{11\pi}{26}$ D) $\sin\frac{\pi}{13}$

Find the exact value of the indicated trigonometric function of θ.

96) $\sec\theta = \frac{9}{4}$, θ in quadrant IV Find $\tan\theta$. 96) _____

A) $-\frac{\sqrt{65}}{4}$ B) $-\sqrt{65}$ C) $-\frac{9}{4}$ D) $-\frac{\sqrt{65}}{9}$

97) $\cos\theta = \frac{20}{29}, \ \frac{3\pi}{2} < \theta < 2\pi$ Find $\cot\theta$. 97) _____

A) $\frac{29}{20}$ B) $-\frac{21}{20}$ C) $-\frac{20}{21}$ D) $-\frac{20}{3}$

Use reference angles to find the exact value of the expression. Do not use a calculator.

98) $\sec\frac{-\pi}{2}$ 98) _____

A) 1 B) 0 C) –1 D) undefined

99) $\tan\frac{-5\pi}{6}$ 99) _____

A) $\frac{\sqrt{3}}{3}$ B) $\frac{\sqrt{3}}{2}$ C) $\sqrt{3}$ D) $-\sqrt{3}$

100) $\sin 855°$ 100) _____

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