

**Solve for x.**

1.  $\frac{5x}{8} - 3 = 12$

2.  $3(x-5) - 5x = 2x - 9$

3.  $\frac{2x-12}{x-3} - 3 = \frac{4}{x-3}$

4.  $x^2 + x = 20$

5.  $2x^2 + 9y = 5$

6.  $2t^2 - 5t = -4$

7.  $|3y - 2| = 8$

8.  $3^{2x-5} = 81$

9.  $4^{3x+2} = 7$

10.  $10 + 12e^{.07x} = 120$

11. solve for L  $M + \frac{P}{K} = \frac{R}{L} - \frac{K}{T}$

12.  $\log x - \log(x+6) = -1$

13.  $3\log(4x-4) + 8 = 20$

**Write as a single logarithm and simplify, if possible.**

14.  $\log 0.01 + \log 1000$

15.  $3\ln x + 2\ln y - (\ln 5x + \ln 3y)$

16. Write as the sum of difference of logarithms;

express powers as factors.  $\ln\left(\frac{xy}{\sqrt[3]{z^2}}\right)$

**Simplify the following:**

17.  $(2x+3)(2x^2 - 3x + 1)$

18.  $(3y-4)^2$

19.  $(u+2)(u-2)(u^2+4)$

20.  $\left(\frac{2x^{-2}y^5z}{3x^2y^{-2}z^3}\right)^{-3}$

21.  $\left(\frac{2a^2b^{-3}}{x^3y}\right)^{-2} \cdot \left(\frac{8x^2y^2}{-3a^3b}\right)^3$

22.  $(x^{-1} - y^{-1})^{-1}$

23.  $e^{\ln x^3}$

24.  $\log_t t^{5713}$

25.  $\ln e^{|4x-5|}$

26.  $(2+i) - (2-i)(3+2i)$

27.  $\frac{3+2i}{2-3i}$

**Evaluate to 3 decimal places.**

28.  $\log_7 5$

29.  $e^{\log 3}$

30.  $4^e + \ln 7$

**Given:**  $\log_a 5 = 2.322$  and  $\log_a 7 = 2.807$ .**Find the following to 3 decimal places.**

31.  $\log_a 25$

32.  $\log_a \frac{5}{7}$

33.  $\log_a 1 - \log_a 35$

34.  $\log_a \sqrt{7}$

35. Convert to exponential equation  $\ln 2x = 3$ 

36. Find the equation of the line (in slope-intercept form) that passes through (3,-1) and (2,-3).

37. Find the distance between the points (7,-5) and (8,-2)

**Let  $f(x) = 2x^2 - 3x + 4$ . Find the following:**

38.  $f(-3)$

39.  $f(t-1)$

40.  $\frac{f(x+h) - f(x)}{h}$

**Solve the following inequalities. Write the solutions in interval notation:**

41.  $3x - 2 \geq 6x + 7$

42.  $|x + 1| > 2$

43.  $3 \left| \frac{x}{2} - 7 \right| \leq 9$

44.  $3k^2 > k + 2$

45.  $1 \leq \frac{3x}{x(x+2)}$

46.  $\frac{x+1}{x-2} > 12$

47. For the function  $f(x) = -x^2 - 4x + 2$

- Find the vertex
- Find the line of symmetry
- Give the x, y coordinates of the maximum or minimum point
- Give the range of the function

**Given the following cost and revenue functions, find the profit function and find the maximum profit as well as the number of units needed to obtain the maximum profit.**

48.  $R(x) = x^3 - 2x^2 - 3$ ;  $C(x) = x^3 - 8x - 7$

49. Sales of Packard Bell computers have grown exponentially. The total revenue function, in millions, is given by  $R(t) = 0.518(1.42)^t$  where t is the number of years since 1990. Find Packard Bell's revenues in 1999, 2002, and 2005 assuming the growth rate remains the same. When will its sales revenue to \$10 million?

50. A company finds that its costs follow the function  $C(x) = .005x^2 - 12x + 4,000$  where x is the number of items made. How many items should it make to minimize its costs?

51. The sum of the width and length of a parallelogram is 90 cm. Find the dimensions for which the area is a maximum.

**Find all asymptotes of the functions.**

52.  $g(x) = \frac{5x^2 + 4x + 3}{5x + 9}$

53.  $f(x) = \frac{x - 2x^2 - 11}{x^2 - 3}$

54. Use your calculator to graph  $f(x) = 1/(x - 4)$
- What is the y intercept, if any?
  - What is the x intercept, if any?
  - What is (are) the vertical asymptote(s), if any?
  - What is the horizontal asymptote, if any?

55. Find the center and the radius of the circle  $x^2 + y^2 - 8x + 2y + 13 = 0$ .

**Determine if each relation is a function. If it is a function, state the domain and range.**

56. What is the domain of  $f(x) = \sqrt{2x - 7}$

57. What is the domain of  $f(x) = \frac{5x + 2}{x^2 - 16}$

58. Find the equation of the line (in slope-intercept form) that passes through (5,-4) and is parallel to  $3x - 5y + 7 = 0$ .

59. Find the equation of the line passing through the point (-1,2) and perpendicular to the line  $x - 3y = -9$

**Given  $f(x) = \frac{5x - 2}{3}$  and  $g(x) = 2x - 1$ . Find the following:**

60.  $f(x) + g(x)$

61.  $(f \cdot g)(x)$

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

63.  $f^{-1}(x)$

64. Suppose  $f(x) = x^3$  and  $g(x) = 2x - 1$

find a)  $(f - g)(2)$  b)  $(fg)(-1)$  c)  $(f / g)(\frac{1}{2})$

d)  $(f \circ g)(-2)$

65. Find the inverse of  $f(x) = \frac{6}{x+2}$

66. Find the inverse of  $f(x) = \sqrt{x+5}$

**Given**  $f(x) = x^4 - x^3 - 31x^2 + 25x + 150$

67. Is -2 a zero of  $f(x)$  ?

68. Find all the zeros of  $f(x)$

69. Use synthetic division to determine whether 3 is a zero of  $f(x) = x^3 + 2x^2 - x + 6$ .

70. Find all the zeros of

$f(x) = x^4 - 5x^3 - 3x^2 + 13x + 10$

71. Find all zeros of  $f(x) = x^3 - 5x^2 + 4x - 20$ .

**Graph the following. State the domain, range, relative extrema, and intervals of increasing/decreasing.**

72.  $f(x) = 8x^3 - 5x^2 - 7x + 5$

73. Write the equation of the function which has the same shape as  $f(x) = |x|$  but has been shifted 7 units to the right and up 5 units and then reflected about the x axis.

74. Use your calculator to graph  $f(x) = 4^x$ . What is the domain? What is the range?

75. Suppose \$2,000 is invested at  $k$  percent, compounded continuously, and grows to \$2,983.65 in 7 years. a) What is  $k$ ? b) How much will be in the account after 9 years? c) How long does it take the money to double?

76. A piece of charcoal is found to contain 30% of its carbon-14. If the decay rate of carbon-14 is -0.00012, how old is the piece of charcoal?

77. Use your calculator to fit an exponential regression to the points: (0,2.8), (1,4.1), (2,5.6), (3,6.2), (4,10.5).

78. The volume  $V$  of a given mass of a gas varies directly as the temperature  $T$  and inversely as the pressure  $P$ . If  $V=231$  cubic centimeters when  $T = 42^\circ$  and  $P=20$  kg/square centimeters, what is the volume when  $T=30^\circ$  and  $P=15$  kg/square centimeters?

79. Find the value of  $x$  in the system of equations.

$x - y + z = 3$

$2x + y - 3z = 5$

$4x + y - z = 11$

### Answers to Review

1. 24

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

3. -7

4.  $x = -5, x = 4$

5.  $x = \pm \sqrt{\frac{5-9y}{2}}$

6.  $\frac{5 \pm \sqrt{7}i}{4}$

7.  $y = 10/3, y = -2$

8.  $x = \frac{\frac{\log 81}{\log 3} + 5}{2} = 4.5$

9.  $x = \frac{\frac{\log 7}{\log 4} - 2}{3} \approx -0.19877$

10.  $x \approx 31.6510$

11.  $L = \frac{RKT}{MKT + PT + K^2}$

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

13.  $x = 2501$

14.  $\log 10 = 1$

15.  $\ln\left(\frac{x^2y}{15}\right)$

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16.  $\ln x + \ln y - \frac{2}{3} \ln z$

17.  $4x^3 - 7x + 3$

18.  $9y^2 - 24y + 16$

19.  $u^4 - 16$

20.  $\frac{27x^{12}z^6}{8y^{21}}$

21.  $\frac{128x^{12}y^8b^3}{-27a^{13}}$

22.  $\frac{xy}{y-x}$

23.  $x^3$

24. 5713

25.  $|4x-5|$

26. -6

27.  $i$

28. 0.827

29. 1.611

30. 45.254

31. 4.644

32. -0.485

33. -5.129

34. 1.404

35.  $e^3 = 2x$

36.  $y = 2x - 7$

37.  $\sqrt{10}$

38. 31

39.  $2t^2 - 7t + 9$

40.  $4x + 2h - 3$

41.  $(-\infty, -3]$

42.  $x > 1$  and  $x < -3$

43.  $8 \leq x \leq 20$

44.  $(-\infty, -\frac{2}{3})$  and  $(1, \infty)$

45.  $(-2, 0) \cup (0, 1]$

46.  $(2, \frac{25}{11})$

47. a)  $(-2, 6)$  b)  $x = -2$  c)  $\max(-2, 6)$  d)  $y \leq 6$

48. 2 units; \$12 max. profit

49. 1999 \$12.16 Million  
2002 \$34.817 Million  
2005 \$99.691 Million  
10 Million sometime in 1999

50. 1200 items

51. 45 cm. by 45 cm.

52. V.A.:  $x = -\frac{9}{5}$

H.A.: none  $\rightarrow$  S.A.:  $y = x - 1$

53. V.A.:  $x = \sqrt{3}$ ,  $x = -\sqrt{3}$

H.A.:  $y = -2$

54. a)  $-\frac{1}{4}$  b) none c)  $x \neq 4$  d) as  $\begin{matrix} x \rightarrow \infty \\ y \rightarrow 0 \end{matrix}$

55.  $C(4, -1)$ ,  $r = 2$

56.  $x \geq \frac{7}{2}$

57.  $x \neq \pm 4$

58.  $y = \frac{3}{5}x - 7$

59.  $y = -3x - 1$

60.  $\frac{11x-5}{3}$

61.  $\frac{10x^2-9x+2}{3}$

62.  $\frac{10x-7}{3}$

63.  $f^{-1}(x) = \frac{3x+2}{5}$

64. a) 5 b) 3 c) undefined d) -125

65.  $f^{-1}(x) = \frac{6}{x} - 2$  [8, 20]

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66.  $f^{-1}(x) = x^2 - 5$

67. yes

68.  $-2, 3, -5, 5$

69. not a zero

70.  $-1, 2, 5$

71.  $5, 2i, -2i$   $D: (-\infty, \infty)$

$R: (-\infty, \infty)$

rel. max. of 6.5 @  $x = -0.3705$

rel. min. of 0.2937 @  $x = 0.7872$

inc.:  $(-\infty, -0.3705), (0.7872, \infty)$

dec.:  $(-0.3705, 0.7872)$

73.  $-|x - 7| - 5$

74. Domain:  $\emptyset$  range:  $y > 0$

75. a)  $k = .05714$  b) \$3344.80 c) 12.13 yrs

76. 10,033 years old

77.  $y = 2.876 \cdot (1.3575)^x$

78.  $220 \text{ cm}^3$

79.  $\frac{14}{5}$