

Algebra & Trigonometry Name _____ Date _____
 Multiple Choice Class _____ Section _____

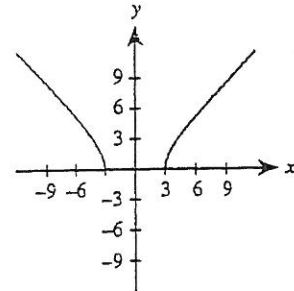
- Simplify: $3x^2(2x)^3(5x^{-1})$.
 (a) $30x^{-6}$ (b) $\frac{6}{5}x^6$ (c) $\frac{24}{5}x^4$
 (d) $120x^4$ (e) None of these
- Simplify: $2x^2y\sqrt[3]{2x} + 7x^2\sqrt[3]{2xy^3} - 4\sqrt[3]{16x^7y^3}$.
 (a) $x^6y^3\sqrt[3]{2x}$ (b) $x^2y\sqrt[3]{2x}$ (c) $9x^2y\sqrt[3]{2x} - 8y\sqrt[3]{2x^7y}$
 (d) $2x^3y$ (e) None of these
- Simplify: $3x(7x - 6) - 4x(x - 2)$.
 (a) $17x^2 - 10x$ (b) $-84x^4 + 240x^3 - 144x^2$ (c) $21x^2 - 14x$
 (d) $72x^3 - 96x^2$ (e) None of these
- Factor completely: $3x^4 - 48$.
 (a) $3(x - 2)^2(x + 2)^2$ (b) $3(x - 2)^4$ (c) $3x^2(x - 4)^2$
 (d) $3(x^2 + 4)(x + 2)(x - 2)$ (e) None of these
- The solution to the linear equation $2 - 3[7 - 2(4 - x)] = 2x - 1$ is:
 (a) $x = -\frac{3}{4}$ (b) $x = \frac{4}{3}$ (c) $x = \frac{3}{4}$
 (d) $x = -\frac{4}{3}$ (e) None of these
- Solve for x : $3x^2 - 6x + 2 = 0$.
 (a) $\frac{3 \pm \sqrt{3}}{3}$ (b) $1 \pm \sqrt{3}$ (c) $\frac{3 \pm \sqrt{15}}{3}$
 (d) $\frac{1}{3}, 2$ (e) None of these
- Solve the inequality algebraically: $-16 \leq 7 - 2x \leq 5$.
 (a) $x \leq 1$ or $x \geq \frac{23}{2}$ (b) $-1 \leq x \leq \frac{23}{3}$ (c) $1 \leq x \leq \frac{23}{2}$
 (d) $-\frac{23}{2} \leq x \leq 1$ (e) None of these
- Find the equation of the line that passes through $(1, 3)$ and is perpendicular to the line $2x + 3y + 5 = 0$.
 (a) $3x - 2y + 3 = 0$ (b) $2x + 3y - 11 = 0$ (c) $2x + 3y - 9 = 0$
 (d) $3x - 2y - 7 = 0$ (e) None of these

9. Given $f(x) = x^2 - 3x + 4$, find $f(x + 2) - f(2)$.

- (a) $x^2 - 3x + 4$ (b) $x^2 + x$ (c) $x^2 + x - 8$
 (d) $x^2 - 3x - 4$ (e) None of these

10. Find the range of the function shown at the right.

- (a) $[-3, 3]$ (b) $(-\infty, -3], [3, \infty)$
 (c) $[0, \infty)$ (d) $(-\infty, \infty)$
 (e) None of these



11. Given $f(x) = \frac{1}{x^2}$ and $g(x) = \sqrt{x^2 + 4}$, find $(f \circ g)(x)$.

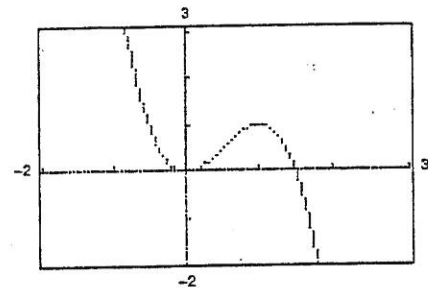
- (a) $\frac{1}{x^2 + 4}$ (b) $\frac{1}{\sqrt{x^2 + 4}}$ (c) $x^2 + 4$
 (d) $\frac{1}{x^2 \sqrt{x^2 + 4}}$ (e) None of these

12. Find all the real zeros of the polynomial function: $f(x) = x^3 - 3x^2 - 4x$.

- (a) -1, 4 (b) -4, 1 (c) -1, 0, 4 (d) 0, 4 (e) None of these

13. Match the graph with the correct function.

- (a) $f(x) = 2x^3 - 3x^2$ (b) $f(x) = 3x^4 - 2x^3$
 (c) $f(x) = 2x^3 + 3x^2$ (d) $f(x) = 3x^2 - 2x^3$
 (e) None of these



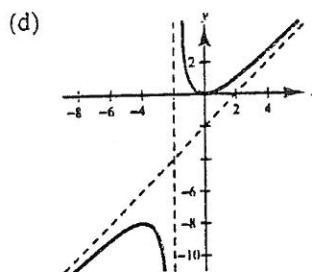
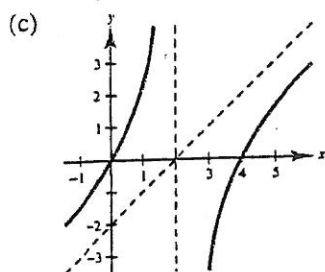
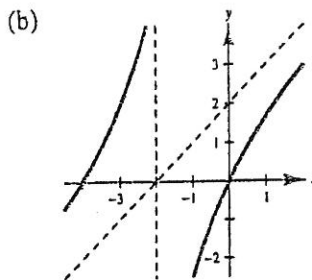
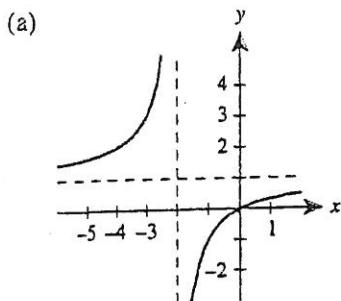
14. An open box is made from a 10-inch square piece of material by cutting equal squares with sides of length, x , from all corners and turning up the sides. The volume of the box is $V(x) = 4x(5 - x)^2$. Estimate the value of x for which the volume is maximum.

- (a) 2.0 inches (b) 1.7 inches (c) 3.4 inches (d) 2.5 inches (e) None of these

15. Find the vertical asymptote(s): $f(x) = \frac{x + 2}{x^2 - 9}$.

- (a) $x = 3$ (b) $x = -2, x = -3, x = 3$ (c) $y = 0, x = -2$
 (d) $x = -3, x = 3$ (e) None of these

16. Match the rational function with the correct graph: $f(x) = \frac{x^2}{x+2}$.



(e) None of these

Find the center of the ellipse: $9x^2 + 4y^2 - 36x - 24y - 36 = 0$.

(a) (2, 3)

(b) (3, -2)

(c) $(2\sqrt{3}, 3\sqrt{3})$

(d) (6, 48)

(e) None of these

18. Evaluate when $t = 3$: $y = \frac{300}{1 + e^{-2t}}$

(a) 299.2582

(b) 213.3704

(c) 300.0025

(d) 107.4591

(e) None of these

19. Write as a sum, difference, or multiple of logarithms: $\log_b \left(\frac{x^3 y^2}{\sqrt{w}} \right)$.

(a) $x^3 + y^3 - \sqrt{w}$

(b) $\frac{1}{3} \log_b x + \frac{1}{2} \log_b y - 2 \log_b w$

(c) $3 \log_b x + 2 \log_b y - \frac{1}{2} \log_b w$

(d) $\frac{3 \log x + 2 \log y}{(1/2) \log w}$

(e) None of these

20. Solve for x : $\log(3x + 7) + \log(x - 2) = 1$.

(a) $\frac{8}{3}$

(b) $3, -\frac{8}{3}$

(c) 2

(d) $2, -\frac{5}{3}$

(e) None of these

21. The yield V (in millions of cubic feet per acre) for the forest at age t years is given by $V = 6.7e^{-48.1/t}$. Find the time necessary to have a yield of 2.1 million cubic feet per acre.

(a) 22.1 years

(b) 25.2 years

(c) 39.8 years

(d) 41.5 years

(e) None of these

~~32~~ Ship A is 72 miles from a lighthouse on the shore. Its bearing from the lighthouse is N 15° E. Ship B is 81 miles from the same lighthouse. Its bearing from the lighthouse is N 52° E. Find the number of miles between the two ships.

- (a) 84.57 (b) 44.44 (c) 49.29 (d) 90.75 (e) None of these

~~33~~ Given v of magnitude 50 and direction 315°, and w of magnitude 20 and direction 210°, find $v + w$.

- (a) $18.0i - 45.4j$ (b) $52.7i - 25.4j$ (c) $18.0i - 25.4j$
 (d) $52.7i - 45.4j$ (e) None of these

35. Find all points of intersection of the graphs:

$$\begin{cases} x^2 + y^2 = 3 \\ 2x^2 - y = 0 \end{cases}$$

- (a) $\left(\frac{3}{2}, -2\right)$ (b) $\left(\pm\frac{\sqrt{3}}{2}, \frac{3}{2}\right)$ (c) $\left(\pm\frac{\sqrt{3}}{2}, \frac{3}{2}\right), (\pm 1, -2)$
 (d) (2, 14) (e) None of these

~~36~~ If $A = \begin{bmatrix} 2 & -1 \\ 3 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 0 \\ -1 & -1 \end{bmatrix}$, find $B - 2A$.

- (a) -14 (b) $\begin{bmatrix} -6 & -1 \\ 5 & 3 \end{bmatrix}$ (c) $\begin{bmatrix} 0 & -2 \\ -7 & -3 \end{bmatrix}$
 (d) $\begin{bmatrix} 0 & 2 \\ -7 & -3 \end{bmatrix}$ (e) None of these

~~37~~ Use Cramer's Rule to solve for y in the system of linear equations:

$$\begin{cases} 3x + 2y - 10z = 5 \\ x - y + z = 10 \\ -7x + 2z = 1 \end{cases}$$

(a) $y = \frac{\begin{vmatrix} 3 & 5 & -10 \\ 1 & 10 & 1 \\ -7 & 1 & 2 \end{vmatrix}}{\begin{vmatrix} 3 & 2 & -10 \\ 1 & -1 & 1 \\ -7 & 0 & 2 \end{vmatrix}}$

(b) $y = \frac{\begin{vmatrix} 3 & 2 & -10 \\ 1 & -1 & 1 \\ -7 & 0 & 2 \end{vmatrix}}{\begin{vmatrix} 3 & 2 & -10 \\ 1 & 10 & 1 \\ -7 & 1 & 2 \end{vmatrix}}$

(c) $y = \frac{\begin{vmatrix} 2 & 5 \\ -1 & 10 \\ 0 & 1 \\ 3 & -10 \\ 1 & 1 \\ -7 & 2 \end{vmatrix}}$

(d) $y = 5 \begin{vmatrix} 3 & 2 & -10 \\ 1 & -1 & 1 \\ -7 & 0 & 2 \end{vmatrix} + 10 \begin{vmatrix} 3 & 2 & -10 \\ 1 & -1 & 1 \\ -7 & 0 & 2 \end{vmatrix} + 1 \begin{vmatrix} 3 & 2 & -10 \\ 1 & -1 & 1 \\ -7 & 0 & 2 \end{vmatrix}$

- (e) None of these

38. Use sigma notation to write the sum: $\frac{2}{3} + \frac{4}{4} + \frac{6}{5} + \frac{8}{6} + \cdots + \frac{14}{9}$.

(a) $\sum_{n=1}^7 \frac{2n}{n+2}$

(b) $\sum_{n=2}^8 \frac{n+2}{n+1}$

(c) $\sum_{n=0}^6 \frac{n+2}{n+3}$

(d) $\sum_{n=3}^9 \frac{n-1}{n}$

(e) None of these

How many different ways (subject orders) can three algebra books, two trigonometry books and two calculus books be arranged on a shelf?

(a) 5040

(b) 210

(c) 128

(d) 823,543

(e) None of these

Two cards are randomly selected from a standard deck of 52 playing cards. Find the probability that one card will be an ace and the other will be a 10.

(a) $\frac{1}{52}$

(b) $\frac{8}{663}$

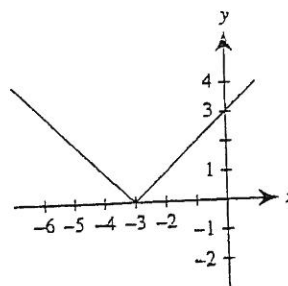
(c) $\frac{1}{169}$

(d) $\frac{2}{13}$

(e) None of these

Algebra & Trigonometry Name _____ Date _____
 Open Ended Class _____ Section _____

- Simplify: $(-2x^2)^5(5x^3)^{-2}$.
- Simplify: $3\sqrt[3]{4x^5y^3} + 7x\sqrt[3]{32x^2y^6}$.
- Write in standard form: $(3x^2 + 2x) + x(1 - 7x) + (2x + 5)$.
- Factor: $4x^3 + 6x^2 - 10x$.
- Solve the equation $3x - [5 - 2(1 - 2x)] = 7x - 5$.
- Solve for x : $\frac{1}{x-1} + \frac{x}{x+2} = 2$.
- Graph the solution: $-16 \leq 7 - 2x < 5$.
- Find the equation of the line that passes through $(-3, -2)$ and is parallel to the line $3x + 2y - 5 = 0$.
- Given $f(x) = 3x - 7$, find $f(x + 1) + f(2)$.
- Find the domain and range of the function shown at the right.



- Given $f(x) = x^3 + 4$ and $g(x) = \sqrt[3]{x}$, find $(f \circ g)(-3)$.
- Find all the real zeros of the polynomial function: $f(x) = 9x^4 - 37x^2 + 4$.
- Use a graph utility to graph the function: $f(x) = 2x^3 - 3x^2$.

14. An open box is to be made from a 16-inch square piece of material by cutting equal squares from each corner and turning up the sides. Verify the volume of the box is $V(x) = 4x(8 - x)^2$. Sketch the graph of the function using a graphing utility and use the graph to estimate the value of x for which $V(x)$ is maximum.

15. Find the vertical asymptote(s): $f(x) = \frac{x^2 - 9}{x^2 - 6x + 8}$.

16. Sketch the graph of $f(x) = \frac{x}{x^2 - 1}$. Label all intercepts and asymptotes.

~~17.~~ Find the center of the ellipse: $5x^2 + 2y^2 - 20x + 24y + 82 = 0$.

18. Evaluate when $t = 65$: $200 - 5e^{0.002t}$.

19. Write as a sum, difference, or multiple of logarithms: $\ln \frac{5x}{\sqrt[3]{x^2 + 1}}$.

20. Solve for x : $\log x + \log(x + 3) = 1$.

21. The yield V (in millions of cubic feet per acre) for a forest at age t years is given by $V = 6.7e^{-48.1/t}$. Find the time necessary to have a yield of 1.7 million cubic feet per acre.

35. Use a graphing utility to find all points of intersection of the graphs:

$$\begin{cases} x^2 - 4x + y = 0 \\ x - y = 0 \end{cases}$$

~~36.~~ If $A = \begin{bmatrix} 2 & -1 \\ -3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 0 \\ -1 & 3 \end{bmatrix}$, find C if $A + C = 2B$.

~~37.~~ Use Cramer's Rule to solve the system of linear equations.

$$\begin{cases} 4x + 6y + 2z = 15 \\ x - y + 4z = -3 \\ 3x + 2y + 2z = 6 \end{cases}$$

38. Use sigma notation to write the sum: $\frac{1}{2} + \frac{2}{6} + \frac{3}{24} + \frac{4}{120} + \frac{5}{720}$.

How many different ways can three chocolate, four strawberry, and two butterscotch sundaes be served to nine people?

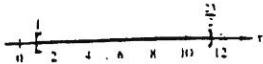
In a group of 10 children, 3 have blond hair and 7 have brown hair. If a child is chosen at random, what is the probability that the child will have brown hair?

Algebra & Trigonometry FINAL EXAM Answers

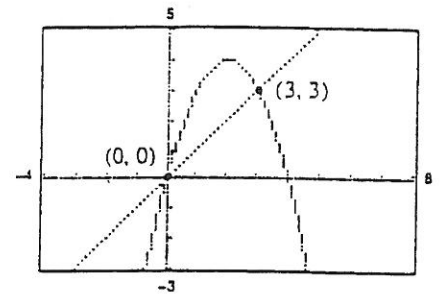
Multiple Choice Test

- | | | | |
|------------------|------------------|-----------------------|-----------------------|
| 1. d | 2. b | 3. a | 4. d |
| 5. c | 6. a | 7. c | 8. a |
| 9. b | 10. c | 11. a | 12. c |
| 13. d | 14. b | Keep 15. d | Keep 16. d |
| 17. a | 18. a | 19. c | 20. a |
| 21. d | 22. a | 23. d | 24. e |
| 25. h | 26. d | 27. c | 28. c |
| 29. c | 30. b | 31. b | 32. b |
| 33. c | 34. a | 35. b | 36. a |
| 37. a | 38. a | 39. b | 40. c |

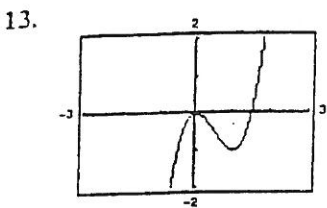
Open Ended Test

- $-\frac{32x^4}{25}$
- $(3 + 14y)xy \sqrt{4x^2}$
- $-4x^2 + 5x + 5$
- $2x(2x + 5)(x - 1)$
- $x = \frac{1}{4}$
- $-1 + \sqrt{7}$
- 
- $3x + 2y + 13 = 0$

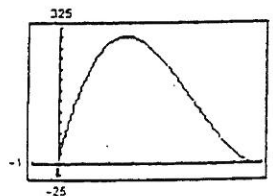
35.



- $3x - 5$
- Domain: $(-\infty, \infty)$, Range: $[0, \infty)$
- 1
- $\pm 2, \pm \frac{1}{3}$



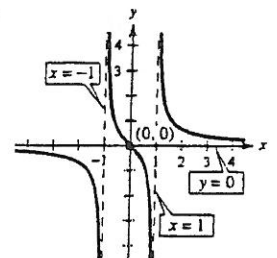
14. $V(x) = 4x(8 - x)^2$



$x \approx 2.67$ inches

$h = 5'$
 $X = 2$
 $K = 4$

16.



18. 194.3059

19. $\ln 5 + \ln x - \frac{1}{3} \ln(x^2 + 1)$

20. 2

21. 35 years

38. $\sum_{n=1}^5 \frac{n}{(n+1)!}$

39. 1260 ways

36. $\begin{bmatrix} -6 & 1 \\ 1 & 2 \end{bmatrix}$

37. $(1, 2, -\frac{1}{2})$

40. $\frac{7}{10}$

Mixed Review (Chapters 1-7)

Find the domain of each function.

1. $f(x) = \frac{x^2 - 9}{x^2 - 3x}$ _____

2. $\{(0, 1), (-1, 3), (3, 5)\}$ _____

Find the range of each function.

3. $g(x) = 8 - 2x - x^2$ _____

4. $\{(0, 1), (-3, 1), (5, 1)\}$ _____

5. $\{(x, y): |x| = y \text{ and } y \leq 2\}$ _____

Write an equation in the form $y - k = a(x - h)^2$ for each parabola described.

6. Vertex is $(-2, 4)$ and passes through the origin _____

7. The x -intercepts are -2 and 6 , and the y -intercept is -6 _____

Simplify over the complex numbers.

8. $(2\sqrt{5} + i)^2$ _____

9. $\frac{\sqrt{3}}{i} + \frac{i}{\sqrt{3}} - \frac{\sqrt{3}}{3i}$ _____

Write an equation in standard form for the line described.

10. Perpendicular to $y = -\frac{3}{2}x + 7$ and passing through $(2, 1)$ _____

11. With slope 0 and x -intercept 0 _____

Simplify. Give answers in terms of positive exponents. Assume exponential variables are positive integers.

12. $(x^2 + 6x - 7)(x - 1)^{-2}$ _____

13. $\frac{x^{n+3} - x^n}{x^{n+2} - x^n}$ _____

14. $\frac{(-3m^2n)^3(3mn)^0}{(2mn^2)^2}$ _____

Write a quadratic equation with integral coefficients having the given roots.

15. $\frac{-5}{2}, 1$ _____

16. $(4 + i\sqrt{2}), (4 - i\sqrt{2})$ _____

Factor completely.

17. $x^4 - 10x^2 + 9$ _____

18. $27x^3 + y^3$ _____

19. $ab + ac + c + b$ _____

20. $3x^3 - 12x$ _____

21. $29y - 21 + 10y^2$ _____

22. $x^2 + 25$ (over complex numbers) _____

(continued)

Mixed Review (Chapters 1-7) *(continued)*

Express as a polynomial in simplest form.

23. $(x - y)(x + y + 1)$ _____

24. $(x + 1)(x - 1)(x + 3)^2$ _____

Give the nature of the roots. Do not solve.

25. $24 - 2t - t^2 = 0$ _____

26. $x^2 - x = -1$ _____

27. $25x^2 + 4 = 20x$ _____

Evaluate.

28. a. $\sqrt[3]{\frac{-64}{125}}$ _____ b. $\sqrt{3^2 - 4^2}$ _____

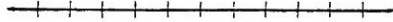
29. $\sqrt{x^{-1} + z^{-1}}$ for $x = 3$ and $z = 8$ _____

30. $f(x) = \frac{3 - x}{3 + x}$ for $f(1 - i)$ _____

31. $\frac{(6.5 \times 10^{-3})(8.2 \times 10^2)}{(4.1 \times 10^5)}$ Give the answer in scientific form. _____

Solve and graph on a number line.

32. $x^2 < 5x$ _____ 

33. $|5x - 4| - 3 \leq 3$ _____ 

34. $\frac{t^2 + 1}{6} + \frac{t + 1}{3} > \frac{1}{2}$ _____ 

35. $(x + 2)(x - 1)(x - 3) > 0$ _____ 

Find y in terms of x .

36. $x^{-1} + 4x^{-2} + 4x^{-3} = x^{-3}y$ _____

Find (a) the GCF and (b) the LCM for:

37. $51x^3y, 34xy^4$ a. _____ b. _____

38. $x^2 - 16, x^2 + 3x - 4$ a. _____ b. _____

(continued)

Mixed Review (Chapters 1-7) (continued)

Write the (a) maximum value and (b) minimum value of the function.

39. $f(x) = 5 - 2x - x^2$ a. _____ b. _____

40. $g(x) = 2x^2 + x$ a. _____ b. _____

Simplify.

41. $\frac{\frac{a}{b} + \frac{a+b}{a-b}}{\frac{a}{b} - \frac{a-b}{a+b}}$ _____

42. $\sqrt[3]{\frac{-7x^5}{56x^2y^6}}$ _____

43. $\frac{r^2 - 16}{16r^2 - 1} \div \frac{4+t}{4t-1}$ _____

44. $\frac{1}{2\sqrt{3} - \sqrt{5}}$ _____

45. $\frac{1}{r^2 + r} - \frac{1}{r^2 - 2r - 3}$ _____

46. $\sqrt{12}(2\sqrt{3} - \sqrt{2})$ _____

Solve. Identify all multiple roots.

47. $(t+5)(t-5) = 11$ _____

48. $\left|3k - \frac{2}{5}\right| = \frac{3}{5}$ _____

49. $\sqrt{x-2} + x = 4$ _____

50. $\frac{x+1}{x-1} = \frac{x}{3} + \frac{2}{x-1}$ _____

51. $4^{3m} = 4^3(4^m)^2$ _____

52. $u^2 + 2u\sqrt{3} - 3 = 0$ _____

53. $2x^2 - 8x = 7$ (by completing the square) _____

54. $y^5 + 11y^3 + 10y = 0$ (over the complex numbers) _____

Solve the system.

55. $\begin{cases} 4x - 3y = 5 \\ 3x + y = 7 \end{cases}$ _____

Solve.

56. The average of a number and its square is 66. Find the number. _____

57. A store bought a \$1000 shipment of sweaters and offered them for sale after a \$15 markup on each sweater. All but 10 sweaters were sold, and the store made a \$400 profit on the sweaters. How many sweaters did the store buy? _____

58. Find the dimensions of a rectangle whose perimeter is 44 cm and whose area is 72 cm². _____

Mixed Review (Chapters 1-11)

Prove.

1. If $\frac{a}{b} = \frac{c}{d}$, then $\frac{a-b}{b} = \frac{c-d}{d}$.

Write an equation of the figure described.

2. A circle with center on $x - 3 = 0$ and tangent to the y -axis at $(0, 1)$ _____

3. The perpendicular bisector of \overline{AB} if $A(2, -1)$ and $B(-4, 3)$ _____

4. A line with x -intercept -3 and parallel to $x = 5$ _____

~~5.~~ An ellipse with foci $(-8, 0)$ and $(8, 0)$, and the sum of the focal radii 20 _____

~~6.~~ A parabola with focus $(2, 2)$ and vertex $(1, 2)$ _____

Simplify.

7. $(x^{-\frac{3}{2}} - 2x^{\frac{5}{2}}) \div x^{\frac{1}{2}}$ _____

8. $\frac{1}{2\sqrt{3} + i}$ _____

9. $(5ab^2)^3(-2a^3bc)^2(2ab)^0$ _____

10. $\frac{\frac{5t-1}{t^2-4}}{\frac{-5t}{2-t} - \frac{1}{t+2}}$ _____

11. $\frac{|-96| \div 12 \div \left(-\frac{1}{4}\right)}{-(4-6)^2}$ _____

For the numbers 18 and 4:

Find the geometric mean. _____

Find the arithmetic mean. _____

Graph (on graph paper provided).

14. the system $x + y \geq 3$
 $2x - y < -1$

~~15.~~ $x^2 + y^2 - 4x - 32 = 0$

(continued)

Mixed Review (Chapters 1–11) *(continued)*

16. $y = |x - 3|$

17. $y = 2x^2 - 4x + 3$

18. $y = 3^x$ and $y = \log_3 x$ on same set of axes

19. $4x^2 - 25y^2 = 100$

20. $y = \sqrt{2 - x}$

The vertices of $\triangle ABC$ are $A(0, 3)$, $B(-4, -4)$, $C(2, -1)$.Is $\triangle ABC$ isosceles? _____Is $\triangle ABC$ a right \triangle ? _____

Find the 12th term of the sequence.

23. 3, -4, -11, ... _____

24. 6, 18, 54, ... _____

Evaluate.

25. $\left(\frac{64}{125}\right)^{-\frac{2}{3}}$ _____

26. $\sum_{t=1}^{40} (3t - 5)$ _____

27. $\log_4 3 - \log_4 192$ _____

28. $(36^{\frac{1}{2}} - 16^{\frac{1}{2}})^3$ _____

29. $f(g(1))$ if $f(x) = \frac{x+3}{x-1}$
and $g(x) = \sqrt{x+5}$ _____

30. $\frac{80!}{78!2!}$ _____

For $f(x) = 2x^3 + 1$ and $h(x) = \frac{1}{3}\sqrt{x}$, find:

31. $f^{-1}(x)$ _____

32. $h^{-1}(x)$ _____

Expand.

33. $(2a - 3b)^6$ _____

Solve the system.

34. $2x + 2y - z = 1$
 $x - 3y - 2z = 3$
 $x - y - z = 2$ _____

35. $3x^2 + 3y^2 = 18$
 $3x^2 - 3y^2 = 12$ _____

36. $y = 2x$
 $x - 2y + 4 = 0$ _____

37. $4x^2 + y^2 = 16$
 $x + y = 2$ _____

(continued)

Mixed Review (Chapters 1-11) (continued)

Find the sum:

38. of the first 20 multiples of 3 _____

39. of an arithmetic series where $n = 22$, $t_1 = 7$, and $t_{22} = 70$ _____

Factor completely.

40. $a^6 - b^6$ _____

41. $36x^5 - 13x^3 + x$ _____

Divide.

42. $\frac{18u^4 - 8u^2 - 3u + 6}{3u - 2}$

43. $\frac{x^4 - 2x^3 - 12x + 2}{x + i}$ (by synthetic division)

Write an equation with integral coefficients that is:

44. polynomial, with roots 3, $1 + i$, and $1 - i$: _____

45. quadratic, with roots $\frac{-5}{3}$ and 7. _____

Solve.

46. $\sqrt[4]{\sqrt{5}} = 5^m$ _____

47. $\ln(\ln x) = 0$ _____

48. $(t + 8)(t - 8) = -10$ _____

49. $(2x - 1)^{\frac{1}{3}} = 81$ _____

50. $\log_3(x + 4) + \log_3 6 = 3$ _____

51. $\frac{x^2}{6} - \frac{x}{3} + \frac{1}{8} = 0$ _____

52. $x^4 - 4x^3 + 20x - 25 = 0$

53. $\sqrt{3x + 1} + 7 = 2$ _____

if $2 - i$ is a root _____

Solve.

54. A side of an equilateral triangle is 12 cm. The midpoints of its sides are joined to form a new equilateral triangle, and this process is continued. Find the sum of the perimeters of the triangles if the process is continued without end. _____

55. A theatre charges \$6.00 for regular tickets, and admits children for \$3.00 and senior citizens for \$4.50. One evening 520 tickets were sold for \$2610. If 3 times as many regular tickets were sold as senior citizen tickets, how many regular tickets were sold? _____

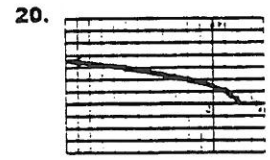
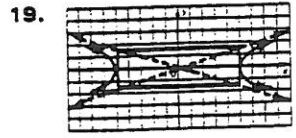
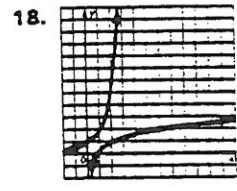
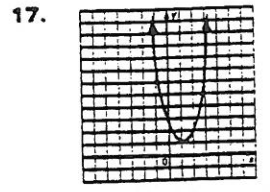
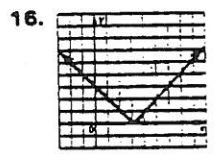
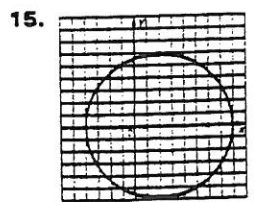
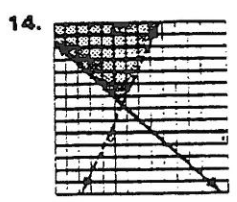
56. If the population of a city doubles in 30 years, how long does it take to triple? _____

57. The width, the length, and the length of the diagonals of a rectangle are consecutive integers. Find their measures. _____

41. $\frac{a-b}{c-b}$ 42. $-\frac{\pi}{2}$ 43. $\frac{1-d}{4d+1}$ 44. $\frac{2\sqrt{3}+\sqrt{5}}{7}$
 45. $-\frac{3}{(r-1)(r-3)}$ 46. $12-2\sqrt{6}$ 47. $i=6$ 48. $k=\frac{1}{3}$
 $-\frac{1}{15}$ 49. 3 50. 3 51. 3 52. $-\sqrt{3} \pm \sqrt{6}$ 53. $\frac{4 \pm \sqrt{30}}{2}$
 54. $0 = i\sqrt{10} \pm i$ 55. $x=2, y=1$ 56. -12 or 11
 57. 50 sweaters 58. 4 cm \times 18 cm

PAGES 164-166 1. $\frac{a}{b} = \frac{c}{d}, a = \frac{bc}{d}$ (Div. Prop.); $a-b = \frac{bc}{d} - b$
 (Subtr. Prop.); $a-b = \frac{bc-bd}{d} = \frac{b(c-d)}{d}$ (Subst. and Distr. Props.);

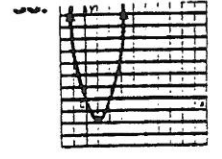
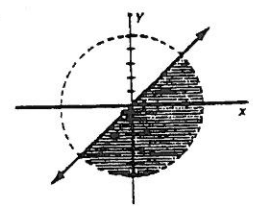
$\frac{a-b}{b} = \frac{c-d}{d}$ (Div. Prop.) 2. $(x-3)^2 + (y-1)^2 = 9$
 3. $2y = 3x + 5$ 4. $x = -3$ 5. $\frac{x^2}{100} + \frac{y^2}{36} = 1$ 6. $x-1 = \frac{1}{4}(y-2)^2$
 7. $\frac{1}{x^2} - 2x^3$ 8. $\frac{2\sqrt{3}-i}{13}$ 9. $-10a^9b^4c^2$ 10. $\frac{5r-1}{5r^2+9r+2}$ 11. 8
 12. $6\sqrt{2}$ 13. 11



21. no 22. yes 23. -74 24. 1,062,882 25. $\frac{25}{16}$ 26. 2300
 27. -3 28. 8 29. $\frac{9+4\sqrt{6}}{5}$ 30. 3160 31. $(\frac{x-1}{2})^3$
 32. $9h^2$ 33. $64a^6 - 576a^5b + 2160a^4b^2 - 4320a^3b^3 + 4860a^2b^4 - 2916ab^5 + 729b^6$ 34. $x=2, y=-1, z=1$ 35. $x = \pm\sqrt{5}, y = \pm 1$
 36. $x = \frac{4}{3}, y = \frac{8}{3}$ 37. $x = -\frac{6}{5}, y = \frac{16}{5}$ 38. 630
 39. 847 40. $(a-b)(a+b)(a^2+ab+b^2)(a^2-ab+b^2)$
 41. $x(3x-1)(3x+1)(2x-1)(2x+1)$ 42. $6u^3 + 4u^2 - 1 + \frac{4}{3u-2}$
 43. $x^3 - (2+i)x^2 - (1-2i)x + 10 + i$, remainder $3 + 10i$
 44. $x^2 - 5x^2 + 8x - 6 = 0$ 45. $3x^2 - 16x - 35 = 0$ 46. $m = \frac{1}{12}$
 47. $x = e$ 48. $i = \pm 3\sqrt{6}$ 49. $x = 14$ 50. $x = \frac{1}{2}$ 51. $x = \frac{1}{2}, \frac{3}{2}$
 52. $x = 2 \pm i, \pm\sqrt{5}$ 53. no solution 54. 72 55. 300
 56. 47.55 years 57. 3, 4, and 5

PAGES 167-168 1. all reals except 0 and $\pm 2i$ 2. all reals
 3. all reals 4. $\{1\}$ 5. $\{y \mid 0 \leq y \leq 2\}$ 6. $y = -2 = -2i$
 7. $y + 6 = \frac{1}{2}(x-2)^2$ 8. $19 + 4\sqrt{5}i$ 9. $-\frac{\sqrt{3}}{3}$ 10. $y = \frac{2}{3}x - 1$
 11. $y = 0$ 12. $\frac{x+7}{x-1}$ 13. $\frac{x^2+x+1}{x+1}$ 14. $-\frac{27m^4}{4n}$ 15. $2x^2 - 3x - 5 = 0$ 16. $x^2 - 8x + 18 = 0$ 17. $(x-1)(x+1)(x-3)(x-5) = 0$ 18. $(3x+y)(9x^2-3xy+y^2)$ 19. $(a+1)(b+c)$ 20. $3x(x-2)$ 21. $(5y-3)(2y+7)$ 22. $(x-5i)(x+5i)$ 23. $x^2 + x - y - y^2$ 24. $x^4 + 6x^3 + 8x^2 - 6x - 9$ 25. rational 26. complex
 27. double, rational 28. a. $-\frac{4}{5}$ b. $i\sqrt{7}$ 29. $\frac{\sqrt{99}}{6}$ 30. $\frac{3+i}{2}$
 31. 1.3×10^{-5}
 32. $0 < x < 5$
 33. $-\frac{2}{5} \leq x \leq 2$
 34. $i < -2$ or $i > 0$
 35. $x > 3$ or $-2 < x < 1$
 36. $y = x^2 + 4x + 4$ 37. a. $17xy$ b. $102x^3y^4$ 38. a. $(x+4)$
 b. $(x+4)(x-4)(x-1)$ 39. a. 2 b. none 40. a. none b.

Structure and Method, Book 2
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31. 8 32. 28 33. $\frac{25}{36}$ 34. 825 35. $-\frac{1}{2}$ 36. $2x^2 - 1$
 37. 210 38. -1 39. $\frac{1}{2}$ 40. undefined 41. 16 42. -2
 43. $\angle B = 49.3^\circ, a = 45.3, c = 69.5$ 44. $\angle A = 20.1^\circ, \angle B = 12^\circ, \angle C = 32.3^\circ$ 45. $b = 13.7$ cm, $\angle B = 66.4^\circ, \angle A = 23.6^\circ$
 46. $\angle A = 20^\circ, b = 139.3$ m, $c = 103.4$ m
 47. $\begin{bmatrix} 5 & -1 \\ 0 & -1 \end{bmatrix}$ 48. $\begin{bmatrix} 8 & -5 \\ 5 & 3 \end{bmatrix}$ 49. $\begin{bmatrix} -4 & 0 \\ 2 & 6 \end{bmatrix}$ 50. $\begin{bmatrix} -\frac{1}{2} & 0 \\ \frac{1}{6} & \frac{1}{3} \end{bmatrix}$
 51. $0 - 12i$ 52. $16\sqrt{3} - 16i$ 53. $x = 2, y = -8, z = -5$
 54. $(2 + \sqrt{5}, 2 - \sqrt{5}), (2 - \sqrt{5}, 2 + \sqrt{5})$ 55. $\pi, -\pi$
 56. 240, -120 57. (2, -3) 58. $(\frac{3}{2}, \frac{7}{4})$ 59. $\pm 2\sqrt{5}$
 60. (9, 4) 61. $\sin \theta = 0.7593, \cos \theta = -0.6508, \tan \theta = -1.1$
 $\csc \theta = 1.3171, \sec \theta = -1.5366, \cot \theta = -0.8571$ 62. $\sin \theta = -0.7454, \tan \theta = 1.1180, \csc \theta = -1.3416, \sec \theta = -1.5, \cot \theta = 0.8944$ 63. $x = -1, y = 3$ 64. $-\frac{56}{65}$ 65. $-\frac{120}{119}$ 66. $\frac{\sqrt{10}}{10}$
 67. 60 68. $\frac{3}{8}$ 69. 8 70. $2\sqrt{3}(\cos 300 + i \sin 300)$ 71. (H, 2), (H, 3), (H, 4), (H, 5), (H, 6), (T, 1), (T, 2), (T, 3), (T, 4), (T, 5), (T, 6)} 72. a. 5 b. 110 73. a. 49 b. 385 74. 4
 75. 522.5 km/h 76. 41.9° 77. $\theta = \frac{7\pi}{6}$ or $\frac{11\pi}{6}$

1. Evaluate: $\left(\frac{8}{27}\right)^{-2/3}$.

2. Simplify:
$$\frac{3x \begin{pmatrix} 5 \\ - \\ 2 \end{pmatrix} (2x - 1)^{3/2} - (2x - 1)^{5/2} (3)}{(3x)^2}$$
.

3. Solve for x : $20x^3 - 500x = 0$.

4. Use a graphing utility to determine the interval(s) over which the function is increasing: $f(x) = \frac{1}{3}x^3 - x + 1$.

5. Identify the type(s) of symmetry: $y = |x| - 2$.

6. Solve the inequality $-6.26x^2 + 7.10 \leq 2.4x$. Round each number in your solution to two decimal places.

7. Write the first five terms of the sequence whose n th term is

$$a_n = \frac{(-1)^n}{n!}. \quad (\text{Assume that } n \text{ begins with } 1.)$$

8. Use a graphing utility to graph the first ten terms of the sequence. (Assume n begins with 1.)

$$a_n = \frac{3n}{n + 1}$$

9. Factor $\frac{1}{4}x^2 - x - 48$.

10. Determine whether the function $f(x) = \frac{x - 4}{x + 3}$ is one-to-one. If it is, find its inverse.

11. Determine the average of the two real numbers $\frac{x}{10}$ and $\frac{x}{2}$.
12. Find the inverse of f informally: $f(x) = 2x$.
13. Use the rules of exponents to write without negative exponents.

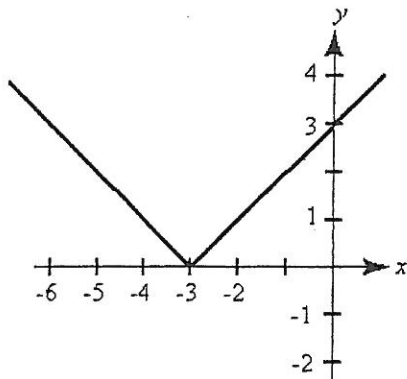
$$\left[\frac{3x^2}{y^{-2}} \right]^{-1}$$
14. Write as a sum, difference, or multiple of logarithms: $\ln \frac{5x}{\sqrt[3]{x^2 + 1}}$.
15. Find all the zeros of the function: $f(x) = x^4 + 2x^3 + 3x^2 - 2x - 4$. Use a graphing utility to graph the function to discard any rational zeros that are obviously not zeros of the function.
16. Solve the system of linear equations:

$$\begin{cases} x + y - 2z = 1 \\ 3x + y + z = 4 \\ -x - 3y + 9z = 10 \end{cases}$$
17. Use a graphing utility to determine the interval(s) on the real axis for which $f(x) \geq 0$ for $f(x) = \sqrt{4 - x^2}$.
18. The area of a triangle is given by $A = \frac{1}{2}bh$ where A is in square inches when b and h are in inches. The height of a triangle is 4 inches shorter than the base and its area is 198 square inches. Find the base and height.
19. Express the perimeter, P , of a square as a function of the length, x , of a side.



Find the determinant of the matrix: $\begin{bmatrix} 2 & 3 & -1 \\ 0 & 5 & 0 \\ -1 & 1 & 2 \end{bmatrix}$.

21. Write as a product of linear factors: $f(x) = x^4 - 100$.
22. Use a graphing utility to graph the function: $f(x) = 2x^3 - 3x^2$.
23. Find the domain and range of the function: $f(x) = |3 + x|$.



24. Use a graphing utility to graph the function $f(x) = -|x - 3|$. Then determine the domain and range.
25. The cost for parts on your automobile repair bill was \$152. The cost for labor was \$30 per hour. Write a linear equation giving the total cost C , in terms of t , the number of hours.
26. Solve the system by the method of elimination and verify the solution with a graphing utility:


$$\begin{cases} 6x + y = -2 \\ 4x - 3y = 17 \end{cases}$$

27. The table shows the total amount, y in millions of dollars, spent by the federal government on mathematics computer science research and development from 1988 through 1998.

Year, t	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Amount, y	643	735	841	904	1160	1225	1292	1531	1554	1672	1831

Construct a scatter plot for the data, let $t = 1$ represent 1988. Find the least squares regression line that fits the data and graph the model on the same set of axes as the scatter plot. (Source: U.S. National Science Foundation)

28. $F(x) = 5 + 2x - x^2$, find $F(k + 1) - F(k - 1)$ and simplify.
29. Use a graphing utility to graph the function $f(x) = \frac{4}{2 + e^{-0.2/x}}$. Use the graph to find any asymptotes of the function.
30. Express the length of the diagonal, L , of a square as a function of the length, x , of a side.
31. Given $f(x) = 3 - 2x^2$, find $\frac{f(x + \Delta x) - f(x)}{\Delta x}$.
32. Restrict the domain of the function $f(x) = (x - 1)^2$ so that it is one-to-one. Then find the inverse and give its domain.

 Write the matrix in reduced row-echelon form:

$$\begin{bmatrix} 21 & 14 & -7 & 10 \\ 7 & 7 & 7 & -1 \\ 3 & -14 & 28 & 23 \end{bmatrix}$$

34. Zack invested \$8000 in a fund that pays $2\frac{1}{2}\%$ more simple interest per year than a similar fund in which his wife had invested \$10,000. At the end of a year their interest totaled \$1690.00. What rate of interest did Zack receive?

35. Find an equation of the line that passes through (2.4, 5.1) and is perpendicular to the line $x + 3y = 6$.

36. Simplify, then write your result in standard form: $\frac{3 + 7i}{3 - 7i}$.

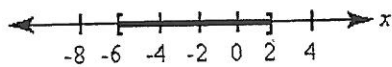
37. The growth of the number of employees hired by a company has been linear for the past ten years, starting at 287 ten years ago and currently standing at 347. Estimate the number of employees that will be employed three years from now (by linear extrapolation).

38. Find the domain of the function: $f(x) = \frac{1}{x + 2}$.

39. A cash register contains x quarters and y dimes. Write an expression for the total amount of money in dollars.

40. Solve for x : $4x^2 + 12x + 9 = 0$.

41. Use absolute value notation to define the interval on the real number line.



~~42.~~ Use a graphing utility to find A^{-1} if it exists, given

$$A = \begin{bmatrix} 1 & 4 & 3 \\ 2 & 6 & 1 \\ 1 & 0 & 3 \end{bmatrix}$$

43. Given $f(x) = x^3 + 4$ and $g(x) = \sqrt[3]{x}$, find $(f \circ g)(-3)$.

44. $\frac{9}{64}x^2 - 49$.

45. Find all of the real zeros of the function: $f(x) = x^3 - \frac{11}{3}x^2 + \frac{5}{3}x + 1$.
46. Find any horizontal and vertical asymptotes: $f(x) = \frac{x}{x^3 - 1}$.
47. Suppose that you accept a job that pays a salary of \$35,000 the first year. During the next 39 years, suppose you receive a 5% raise each year. Write a summation formula to represent your total salary after working n years. What would your total salary be over the 40-year period?
48. How many ounces of water must be added to 100 ounces of 40% antifreeze solution to obtain a 16% solution?
49. Use a determinant to determine whether the points are collinear: $(2, 2)$, $(0, 5)$, and $(4, -4)$.
50. Use a graph utility to graph the function: $f(x) = -x^5 + 4$.
51. Use the rules of exponents to write without negative exponents.
52. Two cars, starting together, travel in opposite directions on a highway, one at 55 mph and the other at 45 mph. How far apart are they after three hours and 12 minutes?
53. The height in feet of a ball thrown by a child is

$$y = -\frac{1}{4}x^2 + 4x + 5$$

where y is the horizontal distance (in feet) when the ball is thrown. Graph the function using a graphing utility. Use the graph to estimate the maximum height the ball reaches.

54. Solve the system of linear equations.

$$\begin{cases} x - 3y + 2z = -11 \\ x + 4y - 5z = 17 \\ -2x + y - z = 6 \end{cases}$$

55. Determine the principal that must be invested at a rate of $9\frac{1}{2}\%$ compounded quarterly so that the balance in 15 years will be \$40,000.

~~56.~~ Find A^{-1} if it exists given

$$A = \begin{bmatrix} 1 & & 1 \\ - & -1 & - \\ 2 & & 2 \\ 1 & & 3 \\ - & 1 & - \\ 4 & & 4 \\ 1 & & 1 \\ - & 0 & - \\ 4 & & 4 \end{bmatrix}$$

57. Perform the operations. Write fractional answers in reduced form.

$$\frac{2}{5} - \frac{1}{3} + \frac{3}{10}$$

58. Use a calculator to approximate the number. Round to three decimal places.

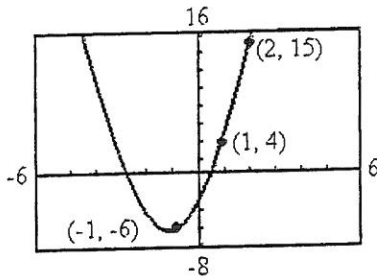
$$\frac{3 + \sqrt{21}}{5}$$

59. Use a graphing utility to find the sum.

$$\sum_{i=1}^5 (10 - 2i)$$

60. Find the sum: $\sum_{i=1}^7 2(i + 1)$.

61. Find the equation of the parabola that passes through the given points. Use a graphing utility to verify your result.



62. Sketch the graph and label the vertex of the function: $f(x) = (x - 2)^2 + 6$.
63. Solve the system by the method of substitution:

$$\begin{cases} 2x^2 - y = -2 \\ x - y = -2 \end{cases}$$

64. Perform the operation and simplify: $2^{3/2} \cdot 2^{5/2}$.

65. Simplify: $\sqrt[3]{3x^2} \sqrt[3]{3x^2}$.

66. Use a graphing utility to graph the equation and approximate any x-intercepts of $y = 3(x - 1) + 6$. Then set $y = 0$ and solve the resulting equation.

67. Use a graphing utility to determine the interval(s) over which the function is increasing: $f(x) = -\frac{1}{3}x^3 - \frac{1}{2}x^2 + 2x$.

68. A group of people could rent a social hall for \$500. When 15 more people join the venture the cost per person is decreased by \$7.50. How many people are in the larger group?

69. Use a graphing utility to graph $y = x^2 - 2x - 3$. Use a standard setting. Approximate any intercepts.

70. Sketch the graph of the function $f(x) = \begin{cases} 3 + 2x, & \text{if } -2 \leq x \leq 0 \\ 3 - x, & \text{if } 0 < x \leq 4 \end{cases}$.

71. Convert to rational exponent form: $\sqrt[3]{125} = 5$.

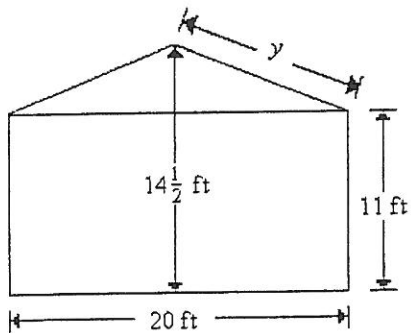
72. Simplify and write the answer without negative exponents.
 $(-2a^2b^3)(-3ab)^3$

73. Write in the form $y = a(x - h)^2 + k$: $y = -x^2 + 3x - 2$.

74. Solve the equation $3(x - 6) = 2 + 2(x - 5)$.

75. Solve the equation $3(x + 3) = 2 - (1 - 2x)$.

76. A homeowner needs to determine the distance y from the peak to the lower edge of the roof on the garage. He knows the distance from the ground to the peak is $14\frac{1}{2}$ feet and the distance from the lower edge of the roof to the ground is 11 feet. Find y if the garage is 20 feet wide.



77. Evaluate $\log_{1/2} 6.8$ using the change of base formula. Round your answer to 4 decimal places.

~~80.~~ Use an inverse matrix to solve the system of linear equations.

$$\begin{cases} 3x + 2y + z = 1 \\ x - y = 10 \\ -x + 2z = 5 \end{cases}$$

79. Find a set of inequalities that describes the triangular region with vertices at $(0, 0)$, $(3, 3)$, and $(5, 0)$.
80. Sketch the graph: $y = \ln(1 - x)$.
81. Solve the inequality $0.2x^2 + 3.6 < 10.6$. Round each number in your solution to two decimal places.
82. Solve for x : $\ln x = 5.3670$. Round your answer to 4 decimal places.
83. Find all the real zeros of the polynomial function: $f(x) = 9x^4 - 37x^2 + 4$.

~~84.~~ Given $A = \begin{bmatrix} 1 & 5 & -1 \\ 2 & 3 & -2 \\ -1 & -4 & 3 \end{bmatrix}$, find A^{-1} .

~~85.~~ Use a graphing utility to graph the region determined by the constraints. Then find the minimum and maximum values of the objective function, subject to the constraints.

Objective function: $z = 3x + 4y$

Constraints:

$$\begin{aligned} x &\geq 0 \\ y &\geq 0 \\ 2x + 3y &\geq 18 \\ 8x + 2y &\leq 32 \end{aligned}$$

86. Solve for x : $2^x - 1 = 16$.
87. Express the area, A , of a square as a function of the length, x , of a side.

88. The height of an object dropped from an initial height of 350 feet is given by $h = 350 - 16t^2$, where t is in seconds and h is in feet. How many seconds (to two decimal places) has the object been falling when it strikes the ground? (Ignore any air resistance.)
89. The function $f(x) = 0.25x^2 + 10$, $0 \leq x \leq 20$ approximates the population of bacteria (in thousands) in terms of the hour x since the culture was exposed to the air. Find the inverse function. What does each variable represent in the inverse function?

90. Evaluate: ${}_{45}C_2$.

~~91.~~ Find the determinant of the matrix:

$$\begin{bmatrix} 3 & 0 & 5 & 1 \\ 0 & -1 & 0 & -1 \\ -1 & 1 & 0 & 3 \\ 0 & 3 & 0 & 3 \end{bmatrix}.$$

92. Use a graphing utility to graph the quadratic function and identify the vertex and x -intercepts: $f(x) = -x^2 + 4x - 3$.

~~93.~~ Use Gaussian elimination to solve the system of equations.

$$\begin{cases} x + 2y + z = 6 \\ 2x - y + 3z = -2 \\ x + y - 2z = 0 \end{cases}$$

94. After t seconds, the height in feet of an object dropped from a hot air balloon is given by:

$$\text{Height} = 300 - 16t^2.$$

Find the height after 2.5 seconds.

95. Find the domain of $\sqrt{36 - x^2}$.

96. Find the x -intercept(s) and the y -intercept(s) of the graph of the equation $y^2 = x + 9$.

97. A train makes a round trip between cities 300 miles apart. On the return half, the average speed is 25 mph faster than the average speed on the trip out and takes 1 hour less time. Find the time required on the trip out.
98. Let $A = \{0, 2, 4\}$ and $B = \{1, 3, 5\}$. Fill in the missing number so that the set of ordered pairs represents a function from A to B .
 $\{(0, 3), (\quad , 5), (2, 1)\}$
99. A sample of nursing homes in a state reveals that 112,000 of 218,000 residents are female. If a nursing home resident is chosen at random from this state, what is the probability that the resident is male?
100. Simplify: $(3x^2y^3z)^{-2}(xy^4)$.
101. Use a graphing utility to graph $y = x^3 - 7x^2 + 12x$. Approximate any x -intercepts. Set $y = 0$ and solve the equation.
102. Use a graphing utility to graph $f(x) = 2^{x-1}$.
103. The ice trays in a freezer are filled with water at 60° F. The freezer maintains a temperature of 0° F. According to Newton's Law of Cooling, the water temperature T is related to the time t (in hours) by the equation

$$kt = \ln \frac{T}{60}$$

After 1 hour, the water temperature in the ice trays is 51° F. Use the fact that $T = 51$ when $t = 1$ to find how long it takes the water to freeze (water freezes at 32° F).

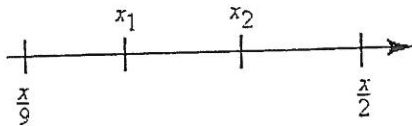
104. Evaluate: $5x^2 - 2x - 1$ for $x = -1$.
105. An open box is to be made from a 16-inch square piece of material by cutting equal squares from each corner and turning up the sides. Verify the volume of the box is $V(x) = 4x(8 - x)^2$. Graph the function using a graphing utility and use the graph to estimate the value of x for which $V(x)$ is maximum.
106. Solve for x : $8x^3 - 343 = 0$.

107. A cash register contains x quarters and y dimes. Write an expression for the total amount of money in cents.
108. An open box is to be made from a 14-inch square piece of material by cutting equal squares from each corner and turning up the sides. Verify the volume of the box is $V(x) = 4x(7 - x)^2$. Graph the function using a graphing utility and use the graph to estimate the value of x for which $V(x)$ is maximum.
109. A city of 500,000 people is growing at a rate of 1% per year. Find a formula for the n th term of the geometric sequence that gives the population n years from now. Then estimate the population 20 years from now.

110. Write a sentence using variation terminology to describe the formula to find the volume of a right circular cylinder, $V = \pi r^2 h$.

111. Find two real numbers that divide the real number line between $\frac{x}{9}$ and $\frac{x}{2}$.

$\frac{x}{2}$ into three equal parts.



112. Write the first 5 terms of the sequence whose n th term is

$$a_n = \frac{n!}{(n + 2)!}. \quad (\text{Assume that } n \text{ begins with } 0.)$$

113. There are 5 red and 4 black balls in a box. If 3 balls are picked without replacement, what is the probability that at least one of them is red?

114. Determine the average of the three real numbers $\frac{x}{5}$, $\frac{x}{3}$, and $\frac{x}{6}$.

~~115.~~ Use an inverse matrix to solve the system of linear equations.

$$\begin{cases} 2x + 3y + 2z = 0 \\ x - 6z = 4 \\ x + y - 2z = 1 \end{cases}$$

116. Write as a sum, difference, or multiple of logarithms:

$$\ln \left[\frac{x^3 \sqrt{y}}{(x^2 + 4)^5} \right]$$

117. \$2100 is invested at a rate of 7% compounded monthly. What is the balance at the end of 10 years?

118. Graphically, determine whether the functions $f(x) = \sqrt{x^2 - 5}$ and $g(x) = x^2 + 5$ are inverses of each other.

119. Simplify: $\frac{1}{8}(3x + 1)^{3/2} + \frac{1}{4}(3x + 1)^{1/2}$.

120. Expand: $[(x - 1) + y]^2$.

121. Find the position equation $s = \frac{1}{2}at^2 + v_0t + s_0$ for an object at the given heights moving vertically at the specified times. Use a graphing utility to plot the points and graph the parabola.

At $t = 1$ second, $s = 36$.
 At $t = 2$ seconds, $s = 36$.
 At $t = 3$ seconds, $s = 4$.

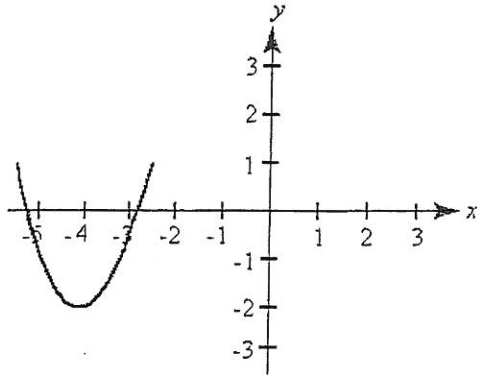
~~122.~~

Find the determinant of the matrix:

$$\begin{bmatrix} 3 & 0 & 1 \\ -1 & 4 & -1 \\ 5 & -2 & 0 \end{bmatrix}$$

123. A grocer wants to mix cashew nuts worth \$8 per pound with peanuts worth \$3 per pound. She wants to obtain a mixture to sell for \$4 per pound. If ten pounds of peanuts are used, what is the total value in dollars of the mixture?

124. Write the equation that matches the graph.



125. Find the intercepts: $f(x) = \frac{4(x^2 + 1)}{x^2 - 6x + 8}$.

126. A projectile is fired straight upward from ground level with an initial velocity of 96 feet per second. When will the height be more than 84 feet?

127. Use a calculator to approximate the number. Round to three decimal places.
 $(2.4)^{3/5}$

128. How many ounces of pure antifreeze must be added to 100 ounces of 40% antifreeze solution to obtain a 60% solution?

129. A ball is shot vertically upward at a speed of 32 feet per second. The equation that relates the position, s , of the ball as a function of time, t , is $s = 32t - 16t^2$, $0 \leq t \leq 2$. Sketch the graph over the interval.

~~130.~~ Use a determinant to determine whether the points are collinear: $(-7, 4)$, $(-1, 2)$, and $(2, 1)$.

131. Complete the following table for $y = 9 - x^2$.

x	-3	-1	0	2	3
y					

132. A small corporation borrowed \$900,000; some at 7% interest, some at 8% interest, and some at 11% interest. How much was borrowed at 11% if the annual interest was \$71,500 and the amount borrowed at 7% was twice the amount borrowed at 8%?

- a) \$400,000
- b) \$800,000
- c) \$150,000
- d) \$300,000
- e) None of these

133. A train makes a round trip between cities 300 miles apart. On the return half, the average speed is 25 mph faster than the average speed on the trip out and takes 1 hour less time. Find the time required on the return trip.

134. Find all the real zeros of the polynomial function:

$$f(x) = \frac{1}{4}x^2 + \frac{1}{2}x - \frac{3}{4}$$

135. Find all real values of x such that $f(x) = 0$: $f(x) = x^3 - 2x^2 - 4x$.

136. List the possible rational zeros of the function. Then use a graphing utility to graph the function to eliminate some of the possible zeros. Finally determine all real zeros of the function: $f(x) = 2x^3 - x^2 - 18x + 9$.

137. Sketch the graph of the function $f(x) = \begin{cases} -x, & \text{if } -2 \leq x < 0 \\ 1, & \\ -x^2, & \text{if } 0 \leq x \leq 2 \\ 4, & \end{cases}$

138. Use a graphing utility to graph $y = x(x + 6)$. Use a standard setting. Approximate any intercepts.

139. Divide: $(2x^4 + 7x - 2) \div (x^2 + 3)$.

140. Ten less than four times a number is 26. Find the number.

141. A merchant plans to sell two models of an item at costs of \$350 and \$400. The \$350 model yields a profit of \$85 and the \$400 model yields a profit of \$90. The total demand per month for the two models will not exceed 150. Find the number of units of each model that should be stocked each month in order to maximize the profit. Assume the merchant can invest no more than \$56,000 for inventory of these items.

142. Write the first 5 terms of the sequence defined recursively. $a_1 = 20$,

$$a_{k+1} = \frac{a_k}{2}$$

143. Find the length of the hypotenuse of the right triangle determined by the points $(-1, 1)$, $(3, 1)$, and $(3, -3)$.

144. A fair coin is tossed four times. What is the probability of getting heads on all four tosses?

145. Use the rules of exponents to write without negative exponents.

$$\left(\frac{b^2}{3a} \right)^{-2}$$

146. Use a graphing utility to graph the quadratic function and identify the vertex and x-intercepts: $f(x) = x^2 - 2x + 3$.

147. Use the Quadratic Formula to solve for x: $5x^2 - 2x + 6 = 0$.

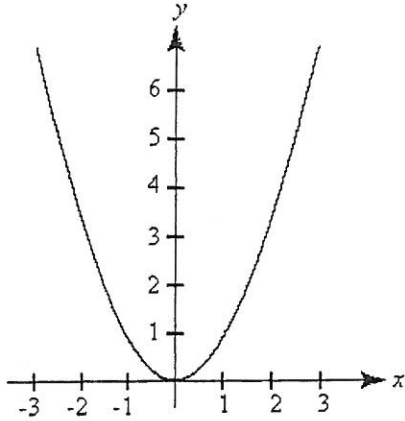
148. Find all real values of x such that $f(x) = 0$: $f(x) = x^3 - 2x^2 - 5x$.

149. Sketch the graph of $f(x) = \frac{3x + 2}{x - 5}$ and label all intercepts and asymptotes.

150. Factor: $3rv - 2vt - 6rs + 4st$.

151. Find the domain: $f(x) = \frac{4 + x}{x^2 - 10}$.

152. Given the graph of $y = x^2$ sketch the graph of $y = (x + 3)^2 - 1$.



153. A grocer wants to mix cashew nuts worth \$8 per pound with peanuts worth \$3 per pound. She wants to obtain a mixture to sell for \$4 per pound. If ten pounds of peanuts are used, what is the total weight of the mixture?

~~154.~~ Use an inverse matrix to solve the system of linear equations.

$$\begin{cases} 6x + 6y - 5z = 11 \\ 3x + 6y - z = 6 \\ 9x - 3y + z = 0 \end{cases}$$

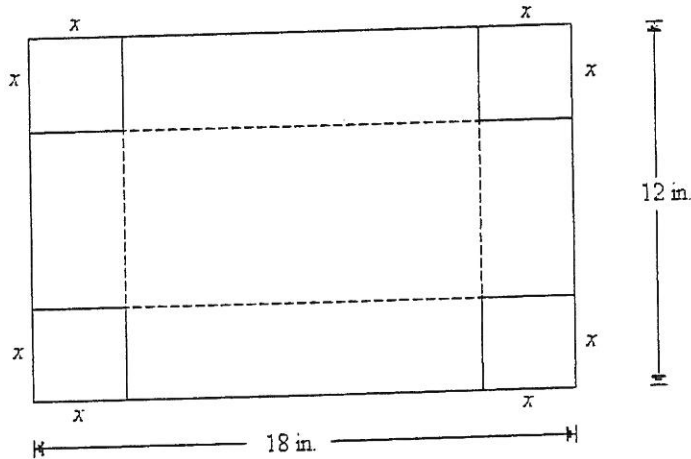
155. After t seconds, the height in feet of an object dropped from a hot air balloon is given by:

$$\text{Height} = 300 - 16t^2.$$

Find the height after 4.0 seconds.

156. A projectile is fired straight upward from ground level with an initial velocity of 64 feet per second. When will the height be more than 48 feet?

157. An open box is made from a rectangular piece of material by cutting equal squares from each corner and turning up the sides. Write the volume of the box as a function of x if the material is 18 inches by 12 inches.

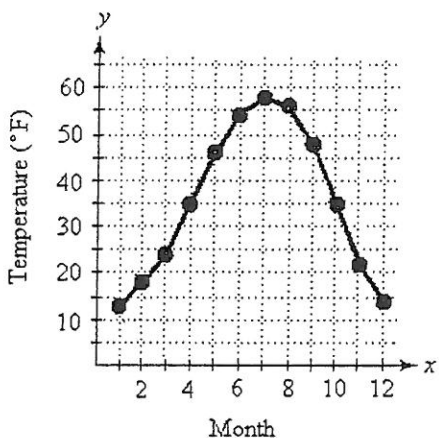


158. Find the 30th term of the arithmetic sequence with $a_1 = -5$ and $d = \frac{1}{3}$. (Assume that n begins with 1.)
159. Use a graphing utility to graph the function $f(x) = x^2 e^x$. Use the graph to determine the intervals for which the function is increasing and decreasing and any relative extrema.
160. A rancher wishes to enclose a rectangular corral with 360 feet of fencing. The fencing is only required on three sides because of an existing stone wall. What are the dimensions of the corral of maximum area?

161. The accompanying figure gives the normal Fahrenheit temperature, y , for Anchorage, Alaska, for each month, x , of the year where $x = 1$ represents January.

Complete the table by approximating the temperature.

Month, x	1	2	3	4	5	6	7	8	9	10	11	12
Temperature, y												



162. Find the equation of the line that passes through $(3, -7)$ and has a slope of $\frac{1}{2}$.

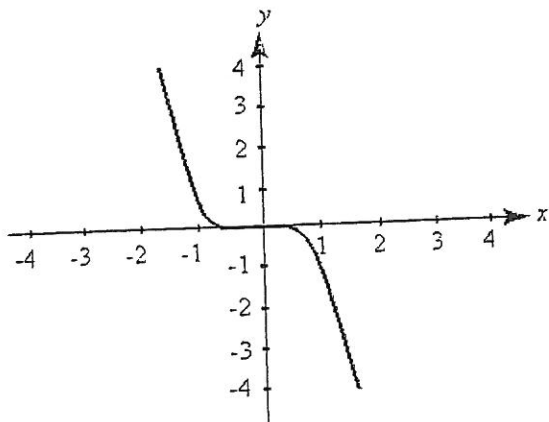
163. Solve for x : $\log_x 16 = 5$. Round your answer to 4 decimal places.

164. Find the first 4 terms of the arithmetic sequence with $a_1 = 4$ and $a_{10} = 58$.

165. Evaluate: $\frac{16 \ln(1/2)}{3 \ln 10}$. Round your answer to 4 decimal places.

166. Solve for x : $\log x + \log(x + 3) = 1$.

167. The graph is a transformation of the graph of $f(x) = x^3$. Find the equation for the function.



168. Solve for x : $2x^4 - 7x^2 + 5 = 0$.

169. Use the Quadratic Formula to solve for x : $4x^2 - 4x + 3 = 0$, and write your answer in standard form.

170. Solve the system of linear equations:

$$\begin{cases} x - y - z = 0 \\ 2x + 4y + z = 0 \\ 3x + y - z = 0 \end{cases}$$

171. Find the distance between the points $(3, 5)$ and $(-2, -1)$.

172. Write an algebraic expression for the distance traveled in t hours at an average speed of 55 miles per hour.

173. Suppose that you accept a job that pays a salary of \$35,000 the first year. During the next 39 years, suppose you receive a 6% raise each year. Write a summation formula to represent your total salary after working n years. What would your total salary be over the 40-year period?

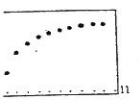
174. Find the slope of the line passing through $(2, 7)$ and $(-8, 7)$.

175. Find all the real zeros of the polynomial function: $f(x) = x^3 - 4x$.

age 1

$$\frac{(x+2)(2x-1)^{3/2}}{6x^2}$$

0, ±5
 (-∞, -1], (1, ∞)
 Symmetric to the y-axis.
 (-∞, -1.27] ∪ [0.89, ∞)
 -1, $\frac{1}{2}$, $\frac{1}{6}$, $\frac{1}{24}$, $\frac{1}{120}$
 See graph below.



$$\frac{1}{2}x + 8 \quad \frac{1}{2}x - 8$$

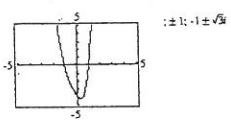
f is one-to-one, $f^{-1}(x) = \frac{3x+4}{1-x}$

$$\frac{3x}{10} = \frac{x}{2}$$

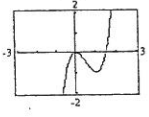
$$f^{-1}(x) = \frac{x}{2}$$

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

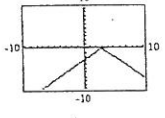
See graph below.



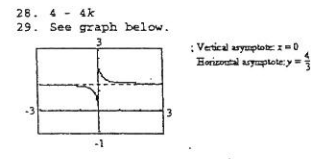
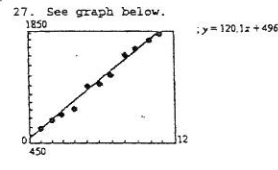
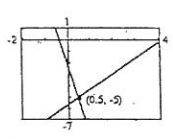
- 16. No solution
- 17. [-2, 2]
- 18. b = 22 inches and h = 18 inches
- 19. P(x) = 4x
- 20. 15
- 21. $f(x) = (x + \sqrt{10})(x - \sqrt{10})(x + \sqrt{10})(x - \sqrt{10})$
- 22. See graph below.



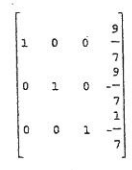
- 23. Domain: (-∞, ∞), Range: [0, ∞)
- 24. See graph below.



- 25. C = 152 + 30t
- 26. $\begin{bmatrix} 1 \\ -5 \end{bmatrix}$

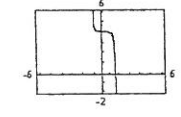


- 28. 4 - 4k
- 29. See graph below.
- 30. $L(x) = \sqrt{2x}$
- 31. -4x - 2Ax
- 32. Possible answers: $f(x) = (x-1)^2, x \geq 1$ or $f(x) = (x-1)^2, x \leq 1$
 $f^{-1}(x) = 1 + \sqrt{x}, x \geq 0$ or $f^{-1}(x) = 1 - \sqrt{x}, x \geq 0$

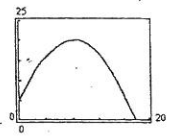


- 34. $\frac{7}{10}$
- 35. $y = 3x - 2.1$
- 36. $\frac{20}{21}$
- 37. 365
- 38. (-∞, -2], (-2, ∞)
- 39. 0.25x + 0.10y
- 40. $\frac{3}{2}$
- 41. $|x+2| \leq 4$
- 42. $\begin{bmatrix} -0.9 & 0.6 & 0.7 \\ 0.25 & 0 & -0.25 \\ 0.3 & -0.2 & 0.1 \end{bmatrix}$
- 43. $\begin{bmatrix} 1 \\ 3 \\ 8 \end{bmatrix} \begin{bmatrix} 3 \\ -x-7 \\ 8 \end{bmatrix} \begin{bmatrix} 3 \\ -x-7 \end{bmatrix}$
- 44. $\frac{1}{8}$
- 45. $\frac{1}{3}, 1, 3$
- 46. y = 0, x = 1
- 47. n

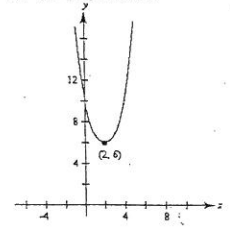
$$\Sigma 35,000(1.05)^{i-1}; S_{40} = \$4,227,992.1$$



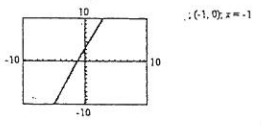
- 48. 150 ounces
- 49. No
- 50. See graph below.
- 51. $\frac{16x^4}{y^6}$
- 52. 320 miles
- 53. The maximum height = 21 feet.



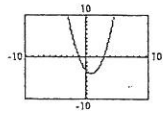
- 54. (-1, 2, -2)
- 55. \$9781.94
- 56. $\begin{bmatrix} 1 & 1 & 1 \\ -1 & 0 & 2 \\ -1 & -1 & 3 \end{bmatrix}$
- 57. $\frac{11}{30}$
- 58. 1.517
- 59. 20
- 60. 70
- 61. $y = 2x^2 + 5x - 3$
- 62. See graph below.



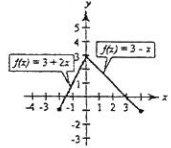
- 63. (0, 2) and $\begin{bmatrix} 1 & 5 \\ - & - \\ 2 & 2 \end{bmatrix}$
- 64. 16
- 65. $\frac{6}{\sqrt{3x^2+5}}$
- 66. See graph below.



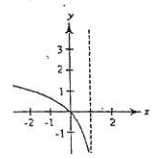
- 67. (-2, 1)
- 68. 40
- 69. x-intercepts: (-1, 0), (3, 0); y-intercept: (0, -3)



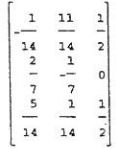
70. See graph below.



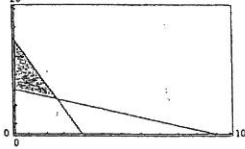
- 71. $125^{1/3} = 5$
- 72. 54×5^6
- 73. $y = -\left(x - \frac{3}{2}\right)^2 + \frac{1}{4}$
- 74. x = 10
- 75. x = -8
- 76. 10.6 feet
- 77. -2.7655
- 78. $\begin{bmatrix} 37 & 73 & 46 \\ 11 & 11 & 11 \end{bmatrix}$
- 79. $y \geq 0, y \leq x,$ and $3x + 2y \leq 15$
- 80. See graph below.



- 81. (-5.92, 5.92)
- 82. 214.2192
- 83. $\pm 2, \frac{1}{3}$

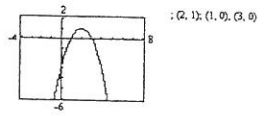


85. z = 24, minimum; z = 64, maximum

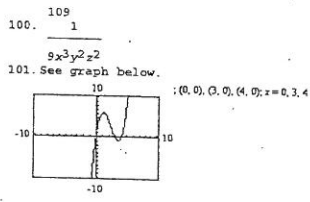


- 86. 5
- 87. A(x) = x^2
- 88. 4.68 seconds
- 89. $f(x) = \sqrt{4(x-10)} = 2\sqrt{x-10}, x \geq 10$

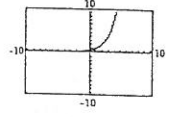
f(x) is the hour since exposure where x is the population of the culture in thousands.



- 93. (-1, 3, 1)
- 94. 200 feet
- 95. [-6, 6]
- 96. x-intercept: (-9, 0)
y-intercepts: (0, 3), (0, -3)
- 97. 4 hours
- 98. 4
- 99. $\frac{53}{109}$

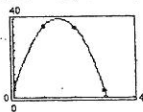


102. See graph below.

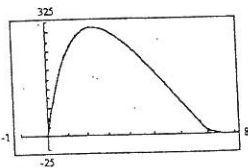
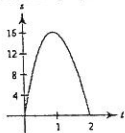


- 103. 3.9 hours
- 104. 6
- 105. $V(x) = x \cdot (16-2x) \cdot (16-2x)$
 $= x \cdot 2(8-x) \cdot 2(8-x)$
 $= 4x(8-x)^2$
 When x = 2.67 inches,
 V(x) is a maximum = 303.4 inches³.

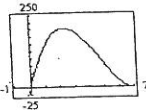
116. $\frac{1}{2} \ln x + \ln y - 5 \ln(x^2 + 4)$
 117. \$4220.29
 118. No, they are not inverses of each other.
 119. $3 - (3x + 1)^{1/2}(x + 1)$
 120. $x^2 - 2x + 1 + 2xy - 2y + y^2$
 121. $a = -32, b = 48, c = 4, s = -16t^2 + 48t + 4$



122. -24
 123. 550
 124. $y = (x + 4)^2 - 2$
 125. $\begin{pmatrix} 1 \\ 0 \\ -2 \end{pmatrix}$
 126. (1.06, 4.94)
 127. 1.691
 128. 50 ounces
 129. See graph below.



106. $x = \frac{7 - 7 \pm \sqrt{31}}{4}$
 107. $25x + 10y$
 108. $V(x) = x \cdot (14 - 2x) \cdot (14 - 2x)$
 $= x \cdot 2(7 - x) \cdot 2(7 - x)$
 $= 4x(7 - x)^2$
 When $x = 2.33$ inches, $V(x)$ is a maximum
 $\text{max} \approx 203.3$



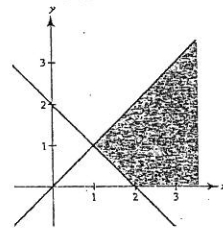
109. $a_0 = 500,000(1.01)^n$; 610,095
 110. The volume is jointly proportional to the height and the square of the radius.
 111. $x_1 = \frac{13x}{54}, x_2 = \frac{10x}{27}$
 112. $\begin{matrix} 1 & 1 & 1 & 1 \\ 2 & 6 & 12 & 20 & 30 \end{matrix}$
 113. $\frac{20}{21}$
 114. $\frac{7x}{30}$
 115. $\left[7, -5, \frac{1}{2} \right]$

130. Yes

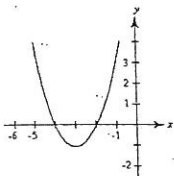
x	-3	-1	0	2	3
y	0	8	9	5	0

132. c
 133. 3 hours
 134. 1, -3
 135. $x = 0, 1 \pm \sqrt{5}$

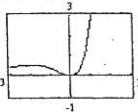
169. $x = \frac{1 \pm \sqrt{2}}{2} - \frac{1}{2}i$
 170. $(a, -a, 2a)$ where a is any real number.
 171. $\sqrt{61}$
 172. 55t
 173. n
 $Z = 35,000(1.06)^{t-1}; S_{40} = \$5,416,668.80$
 174. 1
 175. -2, 0, 2
 176. 1.7604
 177. See graph below.



178. 20



153. 12.5 pounds
 154. $\begin{pmatrix} 1 & 2 \\ 3 & -1 \end{pmatrix}$
 155. 44 feet
 156. (1, 3)
 157. $V = x(12 - 2x)(18 - 2x)$
 158. $\frac{14}{3}$
 159. See graph below.



Increasing on $(-\infty, -2)$ and $(0, \infty)$
 Decreasing on $(-2, 0)$
 Relative maximum: $(-2, \frac{4}{3})$ or $(-2, \frac{4}{3})$
 Relative minimum: $(0, 0)$

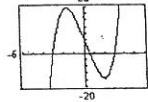
160. 90 feet by 180 feet

161.

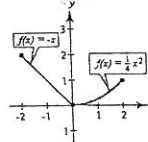
Month, x	1	2	3	4	5	6	7	8	9	10	11	12
Temperature, y	13	18	24	35	46	54	58	56	48	35	22	14

162. $x - 2y - 17 = 0$
 163. 1.7411
 164. 4, 10, 16, 22
 165. -1.6055
 166. 2
 167. $g(x) = -x^3$
 168. $\pm 1, \pm \sqrt{10}$

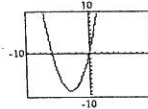
136. See graph below. $\frac{1}{2}, \pm 1, \frac{3}{2}, \pm 3, \frac{9}{2}, \pm 9;$
 $\frac{1}{2}, \pm 3$



137. See graph below.



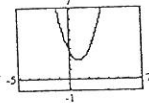
138. x-intercepts: $(-6, 0), (0, 0)$; y-intercept: $(0, 0)$



139. $2x^2 - 6 + \frac{7x + 16}{x^2 + 3}$

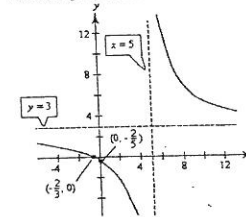
140. 9
 141. 80 of the \$350 model; 70 of the \$400 model
 142. $\frac{5}{2}, \frac{5}{4}$
 143. $\sqrt{412}$
 144. $\frac{1}{16}$

145. $\frac{9a^2}{b^4}$
 146. See graph below. $(1, 2), (2, 1)$



147. $x = \frac{1 + \sqrt{29}i}{5}$

148. $x = 0, 1 \pm \sqrt{6}$
 149. See graph below.



150. $(v - 2s)(3r - 2c)$
 151. All reals except $x = \pm \sqrt{10}$
 152. See graph below.

Honors Algebra II Trigonometry Review

- The point $(-4, 10)$ is on the terminal side of an angle in standard position. Determine 6 trigonometric functions of that angle.
- If $\sin \theta < 0$ and $\cos \theta > 0$, which quadrant does θ lie?
- If $\tan \theta < 0$ and $\sin \theta > 0$, which quadrant does θ lie?
- Evaluate and leave as an exact value
 - $\sin 225^\circ$
 - $\cos 120^\circ$
 - $\tan 90^\circ$
 - $\cos \frac{\pi}{3}$
 - $\cot\left(-\frac{\pi}{3}\right)$
 - $\cos \frac{5\pi}{6}$
 - $\tan \frac{3\pi}{4}$
- Find the reference angle if θ is
 - 620°
 - 200°
 - -135°
 - $\frac{9\pi}{4}$
- Name a positive and negative angle coterminal with
 - $\frac{5\pi}{3}$
 - 300°
- Find the solutions to the equations where $0^\circ \leq \theta < 360^\circ$:
 - $\cos \theta = 0$
 - $\tan \theta = -\sqrt{3}$
 - $\sec \theta = 2$
 - $\sin \theta = \frac{\sqrt{2}}{2}$
- Find the value of $\sin \theta$, if:
 - $\csc \theta = \frac{5}{4}$ where θ lies in QII
 - $\cos \theta = -\frac{3}{8}$ where θ lies in QII
 - $\tan \theta = 1$ where θ lies in QI
- Convert θ into radians:
 - $\theta = 400^\circ$
 - $\theta = 120^\circ$

10. Convert θ into degrees:

a. $\theta = \frac{8\pi}{3}$

b. $\theta = \frac{11\pi}{6}$

c. $\theta = \frac{9\pi}{2}$

11. If a bicycle tire with a radius of 12 inches completes 10 rotations in 15 seconds: **Remember $s = r \cdot \theta$ **

a. What is the angular speed ($\frac{\theta}{\text{min}}$)?

b. What is the linear speed ($\frac{s}{\text{min}}$)?

12. If $\theta = 300^\circ$ and $r = 4$, what is the arc length?

13. Graph the following functions:

a. $f(x) = 3\sin(2x) - 1$

b. $g(x) = -\frac{1}{2}\sin(\pi x) + 3$

c. $h(x) = 5\cos\left(\frac{\pi x}{3}\right)$

d. $j(x) = -\cos(x) + \frac{\pi}{3}$

Honors Algebra II Trigonometry Review

1. The point $(-4, 10)$ is on the terminal side of an angle in standard position. Determine 6 trigonometric functions of that angle.

$$\sin \theta = \frac{5\sqrt{29}}{29} \quad \tan \theta = -\frac{5}{2} \quad \csc \theta = \frac{\sqrt{29}}{5}$$

$$\cos \theta = -\frac{2\sqrt{29}}{29} \quad \sec \theta = -\frac{\sqrt{29}}{2} \quad \cot \theta = -\frac{2}{5}$$

2. If $\sin \theta < 0$ and $\cos \theta > 0$, which quadrant does θ lie?

QIV

3. If $\tan \theta < 0$ and $\sin \theta > 0$, which quadrant does θ lie?

QII

4. Evaluate and leave as an exact value

a. $\sin 225^\circ = -\sqrt{2}/2$

b. $\cos 120^\circ = -1/2$

c. $\tan 90^\circ = \text{undefined}$

d. $\cos \frac{\pi}{3} = 1/2$

e. $\cot\left(-\frac{\pi}{3}\right) = -\sqrt{3}/3$

f. $\cos \frac{5\pi}{6} = -\sqrt{3}/2$

g. $\tan \frac{3\pi}{4} = -1$

5. Find the reference angle if θ is

a. $620^\circ = 80^\circ$

b. $200^\circ = 20^\circ$

c. $-135^\circ = 45^\circ$

d. $\frac{9\pi}{4} = \frac{\pi}{4}$

6. Name a positive and negative angle coterminal with

a. $\frac{5\pi}{3} / \frac{11\pi}{3} / -\frac{\pi}{3}$

b. $300^\circ / 660^\circ / -60^\circ$

7. Find the solutions to the equations where $0^\circ \leq \theta < 360^\circ$:

a. $\cos \theta = 0 \quad 90^\circ + 270^\circ$

b. $\tan \theta = -\sqrt{3} \quad 120^\circ + 300^\circ$

c. $\sec \theta = 2 \quad 60^\circ + 300^\circ$

d. $\sin \theta = \frac{\sqrt{2}}{2} \quad 45^\circ + 135^\circ$

8. Find the value of $\sin \theta$, if:

a. $\csc \theta = \frac{5}{4}$ where θ lies in QII

$\sin \theta = 4/5$

b. $\cos \theta = -\frac{3}{8}$ where θ lies in QIII

$\sin \theta = \frac{\sqrt{73}}{8}$

c. $\tan \theta = 1$ where θ lies in QI

$\sin \theta = \sqrt{2}/2$

9. Convert θ into radians:

a. $\theta = 400^\circ \quad 20\pi/9$

b. $\theta = 120^\circ \quad 2\pi/3$

10. Convert θ into degrees:

a. $\theta = \frac{8\pi}{3} \quad 480^\circ$

b. $\theta = \frac{11\pi}{6} \quad 330^\circ$

c. $\theta = \frac{9\pi}{2} \quad 810^\circ$

11. If a bicycle tire with a radius of 12 inches completes 10 rotations in 15 seconds: **Remember $s = r \cdot \theta$ **

a. What is the angular speed (θ/time)? $80\pi \text{ radians/min} \approx 251.327 \text{ radians/min}$

b. What is the linear speed (s/time)? $960\pi \text{ in/min} \approx 3015.93 \text{ in/min}$

12. If $\theta = 300^\circ$ and $r = 4$, what is the arc length?

$$S = 4 \cdot \frac{5\pi}{3} = \frac{20\pi}{3}$$

13. Graph the following functions:

a. $f(x) = 3\sin(2x) - 1$

b. $g(x) = -\frac{1}{2}\sin(\pi x) + 3$

c. $h(x) = 5\cos\left(\frac{\pi x}{3}\right)$

d. $j(x) = -\cos(x) + \frac{\pi}{3}$

