ALGEBRA II

IGO Test Bank

This test bank was developed by the Blue Ribbon Mathematics Partnership Committee. Members on the committee are mathematics faculty members and administrators from high schools in Hampshire, Harrison, Marion, Monongalia, and Wood counties in West Virginia. Also on the committee are mathematics faculty members and administrators from West Virginia University and West Virginia University - Parkersburg. The test bank was developed for use by Algebra II teachers for self - evaluative purposes. The document was authored by teachers on the committee in order to share sample questions and ideas that are directly related to the West Virginia State Instructional Goals and Objectives for Algebra II. Some questions are open ended and some are multiple choice in order to provide examples of both kinds. Solutions for some of the questions are provided in order to share different solution techniques. You are invited to use this bank of questions and to share it with others. We plan to update the document periodically.

If you would like to contribute some questions (and solutions) please send them to Dr. Laura Pyzdrowski, the Pre-Collegiate Mathematics Coordinator in the Mathematics Department at West Virginia University. Electronic versions of your contributions would be appreciated. The committee is especially interested in solutions that may share different methods or approaches to solving a problem. Also, we are interested in questions pertaining to topics which your students find difficult.

We hope that you find this document useful.

The committee members would like to thank JoAnn Mayhew, from the West Virginia University Mathematics Department, for the many hours she spent putting together this document.

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A2.1

1. For all real numbers a : $\sqrt{a^2}$ = ___?___.

   (a) | a |
   (b) ± a
   (c) a
   (d) - a

2. Solve for x : $\frac{1}{3} < \frac{1}{x+1} < 2.$

3. Using the commutative property of multiplication for real numbers, what does a(b + c) become?

4. The conjugate of a + bi is ___?___.

   (a) -a - bi
   (b) b + ai
   (c) $(a + bi)^{-1}$
   (d) a - bi

5. Evaluate $3(x - y) - y^2$ if $x = -4$ and $y = -5$. Your answer is ___?___.

   (a) -52
   (b) 27
   (c) -22
   (d) -16

6. Solve 7(3 – x) – 2(x + 1) = 1. Your answer is ___?___.

   (a) 2
   (b) $\frac{21}{9}$
   (c) -2
   (d) 6

7. Solve $-6x - 14 > 8x$. Your answer is ___?___.

(a) $-1 < x$
(b) $x < -1$
(c) $x > 1$
(d) $x > -1$

8. Evaluate $3x^2 - 2(y - 4) \div 2$ if $x = -5$ and $y = 1$. Your answer is ___?___.

(a) -18
(b) 78
(c) -12
(d) 12

9. Identify the property or properties illustrated in the following example:

$5(2x + 3) = (3 + 2x)5$

Your answer is ___?___.

(a) Commutative Property of Multiplication
(b) Commutative Property of Addition
(c) Commutative Property of Multiplication and Commutative Property of Addition
(d) Distributive Property of Multiplication over Addition

A2.2

1. Give an equation for a horizontal line.

a. Sketch its graph.
b. Give three points on the line.
c. Name the x and y intercept(s). If no such intercept exists, so state.
d. Determine the slope of your line.

2. What are the coordinates of the point A? (a , b)

(a) (a,c)
(b) (b,c)
(c) (a,d)
(d) (b,d)

(c , d) A

3. Find the equation in standard form of the line through (6,3) and (4, -2).

4. What is the equation for the line that passes through (2, -4) and (-3,1)?

(a) $y = -x - 2$

(b) $y = \frac{1}{2}x + 1$

(c) $y = x + 3$

(d) $y = -\frac{2}{3}x - 4$

5. Find the slope of the line containing the two points whose coordinates are (-1, 2) and (-3, 7). Your answer is ___?___.

(a) $\frac{5}{2}$

(b) $\frac{1}{2}$

(c) $-\frac{5}{2}$

(d) $-\frac{1}{2}$

6. Give the slope of the line having the equation $5x - 2y = 8$. Your answer is ___?___.

(a) $\frac{5}{2}$

(b) 5

(c) $-\frac{5}{2}$

(d) -5

7. Find the equation of the line that has slope -3 and contains the point (-1, 4).
Your answer is ___?___.

(a) $y = -3x - 1$
(b) $y = -3x + 4$
(c) $y = -3x + 1$
(d) $y = -3x + 7$

8. Write the equation of the line passing through (3,4) and (-2, 5).

9. Find the slope of: $3x + 4y + 5 = 6$.

10. Find the equation of the line that goes through the points $\left(-1, \frac{1}{2}\right)$ and $\left(\frac{2}{3}, -3\right)$. Write the answer in slope-intercept form. Your answer is: ___?___.

(a) $y = \frac{10}{21}x + \frac{41}{42}$

(b) $y = -\frac{21}{10}x - \frac{8}{5}$

(c) $y = -\frac{10}{21}x - \frac{1}{42}$

(d) $y = -\frac{21}{10}x + \frac{13}{5}$

11. Find the equation of the line that passes through the point (-2, 5) and is perpendicular to the line $x + 3y = 4$. Write the answer in the form $ax + by = c$. Your answer is: ___?___.

(a) $-3x + y = 11$
(b) $-3x + y = 5$
(c) $x + 3y = 13$
(d) $-9x + 3y = 4$

12. Graph the following equation in two variables: $4x - y = 8$.

A2.3

1. Factor: $x (p + 1) + p + 1$.

2. Factor: $x^{1/2} + 3x$. Your answer is: ___?___.

   (a) $x (x + 3)$
   (b) $x^{1/2} (1 + 3x^{1/2})$
   (c) $x^{1/2} (1 + 3x)$
   (d) $x^{1/2} (1 + 3x^2)$

3. Factor completely: $3x^6 + 21x^3 - 24$.

4. $(x - 2)$ is one factor of $x^3 - 8$. The other factor is ___?___.

5. Factor completely: $x^6 + 125$. Your answer is: ___?___.

   (a) $(x^2 + 5)^3$
   (b) $(x^2 + 5)(x^3 - 25)$
   (c) $(x^2 + 5)(x^4 - 5x^2 + 25)$
   (d) $(x^2 + 5)(x^4 + 5x^2 - 25)$

6. Factor $6x^2 - 13x + 6$.

7. Factor $8x^3 - 27$.

8. Factor the following polynomial completely over the set of rational numbers:

   $16x^4 - 1$

   (a) $(2x + 1)^3 (2x - 1)$
   (b) $(2x + 1)^2 (2x - 1)^2$
   (c) $(4x^2 + 1)(2x + 1)(2x - 1)$
   (d) prime

9. Factor the following polynomial completely over the set of rational numbers:

$2x^3y - 54y$

(a) $2y(x - 3)(x + 3)^2$
(b) $2y(x - 3)(x^2 + 3x + 9)$
(c) $2xy(x^2 - 27)$
(d) $2y(x + 3)(x^2 - 3x + 9)$

10. Factor the following polynomial completely over the set of rational numbers:

$3m^2 + 14mn + 8n^2$

(a) $(3m + 2n)(m - 4n)$
(b) $(m + 1)(3m + 8)$
(c) $(m + 8)(3m + 1)$
(d) $(3m + 2n)(m + 4n)$

11. Factor the following polynomial completely over the set of rational numbers:

$x^3 + 2x^2 - 9x - 18$

(a) $(x + 2)(x + 3)(x - 3)$
(b) $(x + 2)(x^2 + 9)$
(c) $(x - 2)(x^2 + 9)$
(d) $(x - 2)^2 (x + 3)$

A2.4

1. Find the solution set: $-1 \leq \frac{2 - 3x}{4} \leq 5$.

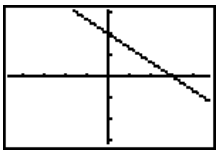
2. Find the solution set: $(2x - 1)^{-1} > 0$. Your answer is: ___?___.

(a) $x < 1/2$
(b) $x \geq 1/2$
(c) $x > 1/2$
(d) $x \leq 1/2$

3. Graph $2x + 3y <= 6$.

4. Which of the following inequalities represents the graph?

(a) $-3x + 2y \leq 4$
(b) $x + 2y > 3$
(c) $x + y < 5$
(d) $2x + 3y \leq 6$



Shade region which includes (0 , 0).

5. Graph the solution set: $\begin{matrix} y \leq 2x - 3 \\ x + 2y > 2 \end{matrix}$.

6. Graph the solution of: $y \geq 3x + 4$

$y \leq -2x - 1$

7. Solve: $5x + 7 > 2x - 9$.

8. Solve the following inequality. Graph the solution on the real number line.

$19 - (2x + 3) \leq 2(x + 3) + x$

A2.5

1. Simplify: $(1 - i)^2$. Your answer is: ___?___.

(a) $-2i$
(b) 2
(c) 0
(d) $2 - 2i$

2. Write in standard a + bi form: $\frac{3+i}{3-i}$.

3. $(2 + 3i)(-4 - 2i) =$ ___?___ .

(a) $-8 - 6i$
(b) $-2 - 16i$
(c) $-2 + i$
(d) $8 - 6i$

4. Simplify $\frac{(2\ 3i)(1+i)^2}{(3-i)}$.

5. Simplify (2 + 3i)(4 - 5i).

6. Simplify $(- i)^{27}$

7. Multiply and write the answer in the form a + b i: $\sqrt{-72}\sqrt{-3}$

   (a) $0 - 6\sqrt{6}\,i$

   (b) $-12\sqrt{3} + 0i$

   (c) $0 + 36i$

   (d) $-6\sqrt{6} + 0i$

8. Simplify: i^{11}

   (a) i
   (b) -1
   (c) -i
   (d) 1

9. Divide and simplify to the form a + b i: $\frac{3+2i}{2+i}$

   (a) $0 + \frac{13}{8}i$

   (b) $\frac{4}{5} + \frac{7}{5}i$

   (c) $\frac{8}{5} + \frac{1}{5}i$

   (d) 4 + 7i

A2.6

1. Write as a single quotient: $(y^2+1)^{\frac{1}{2}} + \frac{y}{3}(y^2+1)^{-\frac{1}{2}} \cdot 3y$.
   (Do not rationalize.)

2. Simplify so that all exponents are positive: $\frac{x^{-1}+y^{-1}}{x^{-1}-y^{-1}}$.

3. Simplify:

   a. $\sqrt{288\,x^4\,y^5}$

   b. $27^{-\frac{4}{3}}$

4. $\left(\sqrt[3]{4^2}\right)\left(\frac{1}{4}^{-\frac{1}{3}}\right) =$ ___?___.

   (a) 4

   (b) $\sqrt[3]{2}$

   (c) 16

   (d) 1

5. Write with exponents and no fractions:

   a. $\frac{x^2 y^{10}}{x^5 (y^2)^3}$

   b. $\sqrt[3]{\frac{x^2}{y^5}}$

6. Simplify $\sqrt{\sqrt{256\,x^{18}}}$

7. Simplify: $\dfrac{x^{\frac{4}{3}}}{x^{\frac{5}{2}}}$

8. Use rational exponents to simplify $\sqrt[5]{32c^{10}d^{16}}$. Write answers in radical notation.

(a) $2c^2 d^3 \sqrt[5]{d}$

(b) $2c^5 d^{11}$

(c) $2c^2 d^3$

(d) $2c^2 d^3 \sqrt[5]{2d}$

9. Write $3\sqrt[4]{2x^2 y^3 z^{10}}$ using rational (fractional) exponents.

(a) $6^{\frac{1}{4}} x^{\frac{1}{2}} y^{\frac{3}{4}} z^{\frac{5}{2}}$

(b) $3 \cdot 2^{\frac{1}{4}} x^{\frac{1}{2}} y^{\frac{3}{4}} z^{\frac{5}{2}}$

(c) $6x^{\frac{1}{2}} y^{\frac{3}{4}} z^{\frac{5}{2}}$

(d) $48x^2 y^{\frac{4}{3}} z^{\frac{2}{5}}$

A2.7

1. Simplify: i^{12}. Your answer is: ___?___.

(a) i
(b) -1
(c) -i
(d) 1

2. Simplify: $(1 + i)^3$.

3. $i^{16} =$ ___?___.

(a) -1
(b) i
(c) 1
(d) -i

4. Simplify: $\frac{i^7 - i^3}{i^2}$.

A2.8

1. Given the quadratic equation $ax^2 + bx + c = 0$; where a, b, and c are real numbers and $a \neq 0$. Give the quadratic formula.

2. The graph of $y = ax^2 + b x + c$; where a, b, and c are real numbers and a 0 will have no x-intercepts if $(b^2 - 4 ac)$ ___?___ 0.

(a) >
(b) ≥
(c) <
(d) ≤

3. a. Solve, using the quadratic formula: $2x^2 + 18 = 10 + 5x$.

b. Solve by completing the square: $5x^2 - 30x + 25 = 0$.

4. The equation $3x^2 - 5x - 4$ has ___?___.

(a) no real roots
(b) two real roots
(c) one real root
(d) one real and one imaginary root

5. Use a graphing calculator to approximate the zeros of the following function to the nearest tenth: $y = 3x^2 + 5x - 6$.

6. Solve for x: $9x^3 - 16x = 0$.

7. Solve for x: $x^2 - 16 = 6x$.

8. Solve: $9x^2 - 27x = 0$.

9. Solve: $4x^2 + x + 3 = 0$.

10. Solve the following equation, by factoring, completing the square, or use of the quadratic formula:

$5x^3 - 45x = 0$

(a) -3, 0, 3
(b) -3, 3
(c) 0, 3
(d) 3

11. Solve the following equation, by factoring, completing the square, or use of the quadratic formula:

$4x^2 - 12x + 7 = 0$

(a) $\frac{3 \pm i\sqrt{2}}{2}$

(b) $-\frac{7}{2}, \frac{1}{2}$

(c) $\frac{7}{2}, \frac{1}{2}$

(d) $\frac{3 \pm \sqrt{2}}{2}$

12. Solve the following equation, by factoring, completing the square, or use of the quadratic formula:

$3w^2 = 4w - 2$

(a) $\frac{2 \pm \sqrt{10}}{3}$

(b) $\frac{2 \pm i\sqrt{10}}{3}$

(c) $\frac{2 \pm i\sqrt{2}}{3}$

(d) $\frac{2 \pm \sqrt{2}}{3}$

A2.9

1. Solve the system using matrices: $\begin{cases} 2x + 3y = 4 \\ 3x + 2y = 3. \end{cases}$

2. Solve the system using matrices: $\begin{cases} \frac{1}{2}x + \frac{1}{3}y = \frac{1}{4} \\ \frac{1}{3}x + \frac{1}{2}y = \frac{1}{3}. \end{cases}$

3. Given $A = \begin{bmatrix} 4 & 0 & 7 \\ 3 & 1 & 6 \\ -2 & 9 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 6 & 2 & 1 \\ 2 & 4 & -3 \\ 7 & -2 & 1 \end{bmatrix}$ find 3A + 2B.

4. In the solution matrix, when these two are multiplied, the element in the second row and the first column is __?__ .

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

(a) 0
(b) -12
(c) -2
(d) 24

A2.10

1. Solve: for x is a real number $\sqrt{3x + 1} = -4$.

2. Solve: $(x^2 + 9)^{1/2} = 5$.

3. Solve: $4x^4 - 17x^2 = -4$.

4. $\sqrt{x^2+1} + 4 = x - 5,$ then x = ___?___.

   (a) $\frac{40}{9}$

   (b) $\frac{11}{3}$

   (c) $\frac{-55}{9}$

   (d) $\frac{16}{3}$

5. Solve: $8^{t+2} = 16^{2t-1}$.

6. Solve: $\log_{10}(x^2 + 1) = 1$.

7. Solve for x: $2x^{\frac{2}{3}} = 32.$

8. Solve for x: $\sqrt{x} = \sqrt[3]{x}$

9. Solve the following radical equation.

   $\sqrt{25+2x} + 11 = 5$

   (a) no solution

   (b) $\frac{11}{2}$

   (c) $-\frac{11}{2}$

   (d) $-\frac{121}{2}$

10. Solve the following radical equation.

$\sqrt[3]{3t+1} - \sqrt[3]{5t-9} = 0$

(a) no solution

(b) 1

(c) $-\frac{5}{4}$

(d) 5

11. Solve the following radical equation.

$\sqrt{7x-3} + 1 = 3x$

(a) 1

(b) no solution

(c) $1, \frac{4}{9}$

(d) $1, \frac{2}{9}$

12. Solve the following radical equation.

$\sqrt{2m-3} = \sqrt{m+7} - 2$

(a) 42, 2
(b) 14
(c) no solution
(d) 2

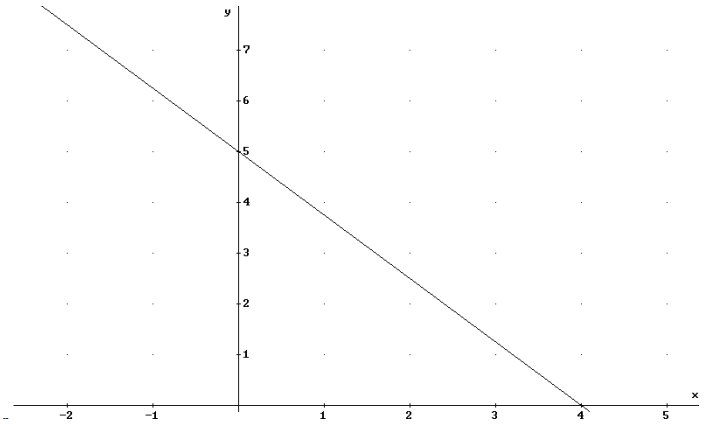
A2.11

1. The points (0, ___) and (1, ___) are always on the graph of $y = a^x$ where $a \in R$ such that $0 < a < 1$ or $a > 1$.

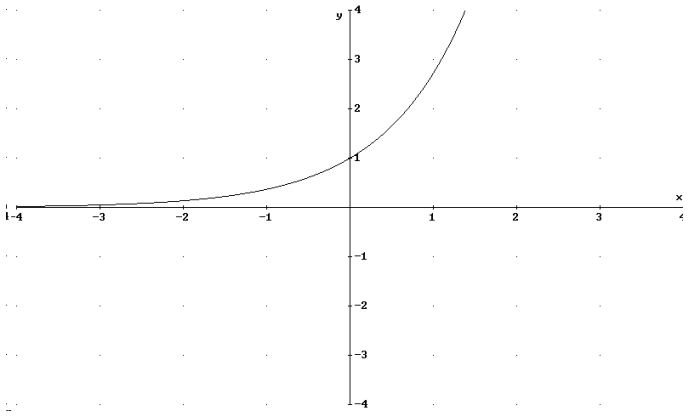
2. Sketch $y = |x|$.

   a. Give three points on the graph.
   b. What are the x and y intercept(s)?
   c. What are the domain and the range (the set of images)?

3. Write the equation of the line in slope-intercept form.



4. The graph can be best represented by the equation ___?___.



(a) $y = \ln x$
(b) $y = x^2$
(c) $y = e^x$
(d) $y = \sqrt{x}$

5. Graph: $y = |x + 3|$.

6. Sketch a graph of the following function. Plot at least five ordered pairs.

$$y = -2\left(x + \frac{3}{2}\right)^2 + 1$$

7. Sketch a graph of the following function. Plot at least five ordered pairs.

$y = |2x + 3| - 1$

A2.12

1. If the points (1, 0) and (a, 1) are on a graph of a one-to-one function, what two points are on the graph of the inverse function?

   (a) (1,0) and (a,1)
   (b) (0,1) and (1, a)
   (c) (1,1) and (0,0)
   (d) (0,a) and (1,a)

2. For $f(x) = \frac{2}{x+1}$ find the domain and range for both f (x) and $f^{-1}(x)$.

   Give your answers using interval notation.

3. If $f(x) = x^2$ and $g(x) = x + 1$ then $f(g(x)) =$ ___?___.

   (a) $x^2 + 2x + 1$
   (b) $x^2 + 1$
   (c) $x^3 + x^2$
   (d) $x^2 + 1$

4. If $f(x) = x^2$ and $g(x) = x + 1$ then $g(f(x)) =$ ___?___.

   (a) $x^2 + 2x + 1$
   (b) $x^2 + 1$
   (c) $x^3 + x^2$
   (d) $x^2 + 1$

5. a. Given $f(x) = 2x - 3$. Find $f(-2)$, $f^{-1}(x)$, and $f^{-1}(-7)$.

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

6. If $f(x) = 3x - 5$ and $g(x) = x^2$ then $g(f(x)) =$ ___?___.

(a) $9x^2 - 30x + 25$
(b) $3x^2 - 5$
(c) $x^2 + 3x - 5$
(d) $6x^2 + 12x - 20$

7. Find the domain, range and zeroes of $f(x) = \dfrac{x - 2}{3x + 1}$.

8. Simplify the quotient if $f(x) = x^2 + 3$, $\dfrac{f(2 + h) - f(2)}{h}$.

9. Give the domain and range of: $y = 4x^2 + 7x^4$.

10. Find $f(-4)$ if $f(x) = 3x^2 + 5x + 2$.

11. Find $f(g(3))$ if $f(x) = x^3$ and $g(x) = 2x - 1$.

12. Make a table of values for $y = 2^x$ for an integer x from 0 to 8.

13. Find the inverse of $f(x) = 6x + 4$.

14. Find the zeros of $f(x) = 4x^2 - 25$.

15. Given $f(x) = \sqrt{x - 2}, 0$find the following:

a. $f\left(\dfrac{11}{2}\right)$

(a) $\dfrac{\sqrt{14}}{2}$

(b) $3\dfrac{\sqrt{2}}{2}$

(c) not a real number

(d) $\dfrac{\sqrt{30}}{2}$

b. domain of f(x)

(a) $(-\infty, 2]$
(b) $(-\infty, -2]$
(c) $[0, \infty)$
(d) $[2, \infty)$

c. range of f(x)

(a) $[-2, \infty)$
(b) $[0, \infty)$
(c) $[2, \infty)$
(d) $(-\infty, 0]$

16. Given $f(x) = \sqrt{x}$ and $g(x) = x^2 + 1$ find the following:

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

(a) $x^2 + 1 + \sqrt{x}$

(b) $x^4 + 1 + x$

(c) $x^4 + 2x^2 + 1 + x$

(d) $\sqrt{x}\,(x^2 + 1)$

b. domain of $(f + g)(x)$

(a) $(-\infty, \infty)$

(b) $(-\infty, 0) \cup (0, \infty)$

(c) $[0, \infty)$

(d) $(-\infty, 0]$

c. (g/f)(x)

(a) $\frac{x^2+1}{\sqrt{x}}$

(b) $\sqrt{x} - x^2 - 1$

(c) $\frac{\sqrt{x}}{x^2+1}$

(d) $\sqrt{x} - x^2 + 1$

d. domain of (g/f)(x)

(a) $(-\infty, 0)$
(b) $[0, \infty)$
(c) $(0, \infty)$
(d) $(-\infty, \infty)$

A2.13

1. An open box is to be constructed from a square sheet of metal by removing a square of side 1 cm. from each corner and turning up the sides. If the box is to hold 4 cubic cm., what should be the dimensions of the sheet of metal?

2. Let $y = 3x^2 + 5x - 2$.

   a. Find the intercepts.
   b. Find the vertex.
   c. Find the line of symmetry.
   d. Find the domain and range.
   e. Indicate if the parabola opens up or down.

3. A rectangle has a perimeter of 32 cm. What is its maximum area?

4. If $x^2 + 5x - 6 \geq 0$, then __?__.

   (a) $x \geq 6$
   (b) $x > 3$ and $x < 2$
   (c) $-6 \leq x \leq 1$
   (d) $x \leq -6$ or $x \geq 1$

5. Find the vertex and zeroes for the graph of $y = 2(x^2 - 3x)$.

6. Solve for x: $2x^2 + 7x - 2 = 0$.

7. Graph $y = -2x^2 + 5$.

8. Model the following situation with a quadratic function and then use it to answer the question:

   What are the dimensions of the largest rectangular pen that a farmer can enclose with 64 meters of fence?

   (a) 8 m by 24 m
   (b) not enough information is given
   (c) 10 m by 12 m
   (d) 16 m by 16 m

9. Solve $2x^2 + x \geq 1$ algebraically.

   (a) $\left[-1, \frac{1}{2}\right]$

   (b) $(-\infty, -1] \cup \left[\frac{1}{2}, \infty\right)$

   (c) $\left(-\infty, -\frac{1}{2}\right] \cup [1, \infty)$

   (d) $\left[-\frac{1}{2}, 1\right]$

A2.14

1. Find the corner points of the following system.

   $x \geq 0$
   $y \geq 0$
   $2x + y \leq 8$
   $x + 2y \leq 8$

2. Subject to the following, maximize $z = 2x + 2y$.

$x \geq 0$
$y \geq 0$
$2x + y \leq 8$
$x + 2y \leq 8$

3. If a region is enclosed by $x + y \leq 6$, $x \geq 1$, $x \leq 4$, and $y \geq 0$, what is the maximum value in this region for $2x + 3y$? Your answer is ___?___.

(a) 14
(b) 17
(c) 12
(d) 19

A2.15

1. $y = \frac{1}{x}$. What is the domain?

(a) $\mathbb{R}$
(b) $(0, \infty)$
(c) $(-\infty, 0) \cup (0, \infty)$
(d) $(-\infty, \infty)$

2. The circumference, c, of a circle varies directly with its diameter, d. Write c as a function of d. Your answer is: ___?___.

(a) $\frac{c}{\pi} = d$

(b) $c = 2\pi r$

(c) $c = \pi \left(\frac{d}{2} \right)^2$

(d) $c = \pi d$

3. A school has enough food to last 300 children for four days. If the population of students is increased by 100 students, how many days will the food last?

4. The price of a diamond varies roughly as the square of its weight. If a diamond weighing 1.8 carats costs $1521, find the cost of a diamond of similar quality weighing 1.2 carats.

A2.16

1. Find the center of the circle: $x^2 + y^2 + 6x - 4y - 3 = 0$. Your answer is: ___?___.

   (a) (-3, 2)
   (b) (3, -2)
   (c) (-3, -2)
   (d) (3, 2)

2. Give an equation for a parabola that intersects the x-axis at (-1, 0), (1, 0) and opens downward.

3. Identify the vertex of the parabola determined by $x^2 - 10x - 12y + 97 = 0$.

4. The equation $4x^2 + 6x - 5y^2 + 2 = 0$ represents ___?___.

   (a) an ellipse
   (b) a circle
   (c) a hyperbola
   (d) a parabola

5. Find the center and radius of the circle given by: $x^2 + y^2 - 4x + 6y - 12 = 0$.

A2.17

1. Solve for x:

   a. $| x - 1 | > 2$.
   b. $| x - 1 | < 2$.
   c. $| x - 1 | = 2$.

2. Solve and graph the solution set on the real number line: $|3x - 1| + 10 = 25$.

3. If $|3x + 6| \geq 4$, solve for x.

4. Solve the open sentence: $|2x + 1| = 7$.

   (a) $x = 3$
   (b) $x = 3$ and $x = 4$
   (c) $x = 3$ and $x = -4$
   (d) $x = 6$ and $x = -8$

5. Graph $y = |x - 5|$.

6. Solve the following equation algebraically: $|2x – 5| - 8 = -1$

   (a) 6

   (b) -6

   (c) 6, -1

   (d) -1

7. Solve the following equation graphically: $|2x + 4| + 3 = 9$

   (a) 1

   (b) -5

   (c) no solution

   (d) 1, -5

8. Solve the following inequality algebraically: $|2x – 3| > 18$

   (a) $\left(-\infty, \ -\frac{15}{2}\right) \cup \left(\frac{21}{2}, \ \infty\right)$

   (b) $\left(-\frac{15}{2}, \ \frac{21}{2}\right)$

   (c) $\left(-\frac{21}{2}, \ \infty\right)$

   (d) $\left(-\frac{15}{2}, \ \infty\right)$

9. Solve the following inequality graphically: $|5 - 2x| > 6$

(a) $\left(-\infty, \frac{11}{2}\right)$

(b) $\left(-\infty, -\frac{1}{2}\right) \cup \left(\frac{11}{2}, \infty\right)$

(c) $\left(-\frac{1}{2}, \frac{11}{2}\right)$

(d) $(-\infty, \infty)$

10. Solve the following inequality algebraically: $|3x + 5| \leq 1$

(a) $\left(-\infty, -2\right]$

(b) $\left[-2, -\frac{4}{3}\right]$

(c) $\left(-\infty, -2\right] \cup \left[-\frac{4}{3}, \infty\right)$

(d) no solution

11. Solve the following inequality graphically: $|5x - 6| \leq 3$

(a) $\left[\frac{3}{5}, \frac{9}{5}\right]$

(b) $\left(-\infty, \frac{3}{5}\right] \cup \left[\frac{9}{5}, \infty\right)$

(c) $\left(-\infty, \frac{3}{5}\right]$

(d) $\left(-\infty, \frac{9}{5}\right]$

A2.18

1. Transform to exponential form: $\log_{\pi} 2 = y$ 0. Your answer is: ___?___.

   (a) $2^y = \pi$
   (b) $\pi^2 = y$
   (c) $\pi^y = 2$
   (d) $2^y = \pi$

2. Evaluate (to the nearest hundredth): $\log_2 3 = y$. Your answer is: ___?___.

   (a) 0.17
   (b) 0.40
   (c) 0.63
   (d) 1.58

3. a. Express $4^3 = 64$ in logarithmic form.
   b. Express $\log_3 x^2y^5$ in expanded form.

4. If $y = \log_2 x$, then which of the following is true?

   (a) $2^y = x$
   (b) $y^2 = x$
   (c) $2^x = y$
   (d) $x^y = 2$

5. If $(x + 3)^{2/3} = 16$, then x = ___?___.

   (a) 14

   (b) $\frac{18}{3}$

   (c) 22

   (d) 61

6. Solve: $3^{x-1} = 10$.

A2.19

1. An open box is to be constructed from an 8½ inch x 11 inch sheet of paper by removing congruent squares from each corner and turning up the sides. If the squares are discarded, give an equation for the volume of the box in terms of x where x is the length of the square in inches.

2. Give an equation for the combined volume of open boxes constructed from 5 sheets of 8½ inch x 11 inch paper. Five boxes are formed by tearing congruent squares from the corners of the 5 sheets and turning up the sides. The remaining open boxes are to be constructed from the whole pieces of leftover squares. Let x be the length of the square.

A2.20

A2.21

A2.22

1. Use your grapher to graph $3x + 2y = 9$.

2. Solve $3x - 2 = 9$ graphically.

   (a) 0

   (b) $\frac{3}{11}$

   (c) $\frac{11}{3}$

   (d) $\frac{2}{3}$

A2.23

1. Solve $5x - 2 \leq 5$ graphically.

   (a) $\left[\frac{3}{5}, \infty\right)$

   (b) $(-\infty, \frac{3}{5}]$

   (c) $\left[\frac{7}{5}, \infty\right)$

   (d) $(-\infty, \frac{7}{5}]$

2. Solve $2.7x - 13.1 > 3.1$ graphically.

   (a) $(-\infty, 6)$

   (b) $(6, \infty)$

   (c) $(-\infty, 3.7)$

   (d) $(3.7, \infty)$

A2.24

1. Use a graphing calculator to approximate the zeros of the following function to the nearest tenth: $Y = 3X^2 + 5X - 6$.

2. Solve the following equations graphically.

a. $4x^2 - 12x + 9 = 0$

(a) 0

(b) $0 , \frac{3}{2}$

(c) $\frac{3}{2}$

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

b. $10x^2 - x - 2 = 0$

(a) - .89 , .79
(b) no real solution
(c) - .4 , .5
(d) $\frac{3}{5}$

3. Solve the following inequalities graphically:

a. $x^2 + 8 > 6x$

(a) $(-\infty, 2) \cup (4, \infty)$
(b) (2, 4)
(c) $(-\infty, -4) \cup (-2, \infty)$
(d) (-4, -2)

b. $x^2 + 6x + 9 < 0$

(a) $(-\infty, \infty)$
(b) no real solution
(c) $(-\infty, -3) \cup (3, \infty)$
(d) (-3, 3)

A2.25

1. Solve $8x^3 > 125$.

2. Use your grapher to answer the following questions:

$$f(x) = \frac{x - 3}{2x - 5}$$

a. Find f(0)

(a) not defined

(b) $-\frac{3}{5}$

(c) $\frac{3}{5}$

(d) $\frac{1}{2}$

b. Find s such that f(x) = 1

(a) $\frac{2}{3}$

(b) - 2

(c) $-\frac{2}{3}$

(d) 2

c. Find the domain of f

(a) $(-\infty, \infty)$

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

(c) $\left(-\infty, \frac{5}{2}\right) \cup \left(\frac{5}{2}, \infty\right)$

(d) $\left(-\infty, \frac{5}{2}\right) \cup \left(\frac{5}{2}, 3\right) \cup (3, \infty)$

d. Find the range of f

(a) $\left(-\infty, -\frac{1}{2}\right) \cup \left(-\frac{1}{2}, \infty\right)$

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

(c) $(-\infty, \infty)$

(d) $\left(-\infty, \frac{1}{2}\right) \cup \left(\frac{1}{2}, \infty\right)$