

Burlington

County

College

MATH 095

**Intermediate
Algebra:**

**COURSE
SYLLABUS**

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FALL 2011

**Science, Mathematics
And
Technology**

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Math 095: Intermediate Algebra

- Division:** Science, Mathematics, and Technology
- Credit Hours:** Four (4) credits
- Prerequisites:** Elementary Algebra skills/ Math 075 or one year of high school Algebra
- Textbook:** Intermediate Algebra, Fourth Edition, by Elayn Martin-Gay, 2012, Prentice Hall/Pearson Education, Inc.

Course Description: This course is designed to prepare students of developmental mathematics to make the transition from elementary algebra to the college level mathematics courses. Topics include graphs and transformations of functions, linear and absolute value equations and inequalities, systems of linear equations and inequalities in two variables, radicals and complex numbers, quadratic functions, equations and inequalities, and rational expressions.

Required Materials for Instruction: Textbook, as listed above.

Calculator: a graphing calculator may be used throughout the course during classroom discussions only. Its use is NOT permitted on any test or final. Scientific calculators are permitted.

Course Syllabus (in the college store)

Optional Materials: Interactive DVD Lecture Series available in College Libraries
Chapter Test Prep Videos available via the DVD Lecture Series,
MyMathLab, YouTube (search MartinGayInterAlgPB)
The Student Organizer, available for download in the Martin-Gay
MyMathLab course (access code required)
Student Solutions Manual

Attendance/ College Policies Attendance is taken at all class meetings. Please refer to the Burlington County College Student Handbook for details of the college's policies for attendance, as well as for the Student Conduct Code, the Student Grade Appeals Process, and the Academic Integrity Code.

Course Content:

Unit I – Chapter 3: Graphs and Functions

1. Graphing Linear Equations (3.1)
2. The Slope of a Line (3.2)
3. The Slope-Intercept Form (3.3)
4. More Equations of Lines (3.4)
5. Introduction to Functions (3.6)
6. Finding Domains and Ranges from Graphs and Graphing Piecewise-Defined Functions (3.7)
7. Shifting and Reflecting Graphs of Functions (3.8)

Unit II – Parts of Chapters 2 and 4, 3.5: Linear Inequalities; Systems of Linear Equations and Inequalities

1. Linear Inequalities and Problem-Solving (2.4)
2. Sets and Compound Inequalities (2.5)
3. Absolute Value Equations (2.6)
4. Absolute Value Inequalities (2.7)
5. Graphing Linear Inequalities in Two Variables (3.5)
6. Solving Systems of Linear Equations in Two Variables by Graphing, Substitution, and Elimination (4.1)
7. Graphs of Systems of Linear Inequalities in Two Variables (4.5)

Unit III – Parts of Chapters 5 and 6: Factoring; Rational Functions and Rational Expressions

1. The Greatest Common Factor and Factoring by Grouping (5.4)
2. Factoring Trinomials (5.5)
3. Factoring by Special Products (5.6)
4. Solving Equations by Factoring and Solving Application Problems (5.7)
5. Rational Functions and Multiplying/Dividing Rational Expressions (6.1)
6. Adding and Subtracting Rational Expressions (6.2)
7. Simplifying Complex Fractions (6.3)

Unit IV – Chapter 7: Rational Exponents, Radicals, and Complex Numbers

1. Radical Expressions and Radical Functions
2. Rational Exponents
3. Simplifying Radical Expressions
4. Adding, Subtracting, and Multiplying Radical Expressions
5. Rationalizing the Denominators of Radical Expressions
6. Radical Equations and Problem Solving
7. Complex Numbers

Unit V – Chapter 8: Quadratic Equations and Functions

1. Use the Square Root Property to Solve Quadratic Equations

2. Solving Quadratic Equations by Completing the Square (8.1)
3. Solving Quadratic Equations by Using the Quadratic Formula (8.2)
4. Nonlinear Inequalities in One Variable (8.4)
5. Quadratic Functions and Their Graphs (8.5)
6. Further Graphing of Quadratic Functions (8.6)

Evaluation:

There are **five (5) tests** – one each on Units I, II, III, IV and V. Each test will be graded using the following scale:

| <u>Percent Correct</u> | <u>Letter Grade</u> |
|------------------------|---------------------|
| 100 – 90 | O (Outstanding) |
| 89 – 70 | P (Passing) |
| 69 – 0 | U (Unsatisfactory) |

The **final exam**, to be administered during exam week, is comprehensive and **MUST be passed with a score of at least 70%**. There are 40 multiple-choice questions on the exam.

The **Companion** to the ACCUPLACER (a standardized placement test on basic algebra skills) will be administered to every section of Mth 095 during the 14th week, but **ONLY** during FALL semesters. Allow one hour to do so during the last class day.

The **course grade** will be determined from the final test average. Adding the percent grades for each test, along with the score for the final exam (which must be at least 70%), and dividing this sum by six will compute the course average. The letter grades listed in the above scale will be used to determine the course grade.

There are **NO** retests for any unit test. Grades of “I” or “X” are assigned at the discretion of the instructor.

Unit I: – Chapter 3: Graphs and Functions

Objectives: Upon completion of this unit, the student should be able to define, explain, symbolize, and/or illustrate the following:

| | | |
|----------------------------|-------------------------------|----------------------------------|
| ordered pairs | rectangular coordinate system | origin |
| Cartesian plane | x-axis/y-axis | quadrants |
| coordinates | solution point | Standard Form |
| graph | linear equation | intercepts (x- and y-) |
| slope | slope-intercept form | point-slope form |
| functions; linear/constant | Function Notation | Piecewise-Defined Function |
| domain/range | Relation | Parallel and Perpendicular Lines |

Upon completion of this unit, the student should be able to:

1. Plot points on a rectangular coordinate system

2. Given a linear equation, determine ordered pairs that are solutions
3. Graph Linear Equations; Vertical and Horizontal Lines
4. Find and use the x- and y- intercepts to sketch a graph
5. Find the slope of a line from two points
6. Find the slope given the equation of the line
7. Compare the slopes of parallel and perpendicular lines
8. Graph a line using its slope and y-intercept
9. Use Slope-Intercept Form to write an equation of a line
10. Use Point-Slope Form to write the equation of a line
11. Determine if a Relation is a Function
12. Sketch graphs of functions on a rectangular coordinate system
13. Use the Vertical Line Test for functions
14. Find the Domain/Range from a Graph
15. Graph Piecewise-Defined Functions
16. Identify and sketch shifting and reflecting of graphs of functions

Unit II – Chapters 2, 3.5, and 4: Linear Inequalities; Systems of Linear Equations and Inequalities

Objectives: Upon completion of this unit, the student should be able to define, explain, symbolize, and/or illustrate the following:

| | | |
|---|-----------------------|---|
| linear inequalities | solution set | graph of an inequality in one variable |
| interval notation | compound inequalities | |
| intersection | union | absolute value equations/inequalities |
| graph of linear inequalities in two variables | | system of equations |
| solution of a system | consistent system | dependent system |
| inconsistent system | substitution method | elimination method |
| linear inequality (in two variables) | | solution of a linear inequality |
| system of linear inequalities | | solution of a system of linear inequalities |

Upon completion of this unit, the student should be able to:

1. Solve linear inequalities in one variable
2. Use Interval Notation
3. Solve compound inequalities
4. Solve application problems involving inequalities
5. Solve absolute value equations and inequalities
6. Graph Linear Inequalities in Two Variables
7. Determine whether an ordered pair is a solution of a system of two linear equations
8. Solve a system of equations by graphing, by substitution, and by the elimination method
9. Graph a System of Linear Inequalities in Two Variables

Unit III – Chapters 5 and 6: Factoring; Rational Functions and Rational Expressions

Objectives: Upon completion of this unit, the student should be able to define, explain, symbolize, and/or illustrate the following:

Factoring Polynomials by Greatest Common Factor; by Grouping
Factoring Trinomials; Perfect Square Trinomials
Factoring Difference of Two Squares; Sum or Difference of Two Cubes
Solve Polynomial Equations by Factoring
Solve Problems that can be modeled by Polynomial Equations
Rational expression domain of a rational expression
Rational function domain of a rational function
simplified (or reduced) form complex fractions
Least Common Denominator (LCD)

Upon completion of this unit, the student should be able to:

1. Factor polynomials/trinomials by various methods
2. Solve Polynomial Equations by Factoring
3. Solve Real-Life Problems
4. Find the domain of a rational function
5. Simplify rational expressions
6. Multiply rational expressions
7. Divide rational expressions
8. Add and Subtract Rational Expressions with the Same Denominator
9. Find the Least Common Denominator of Rational Expressions
10. Add and Subtract Rational Expressions with Different Denominators
11. Simplify Complex Fractions

Unit IV – Chapter 7: Rational Exponents, Radicals, and Complex Numbers

Objectives: Upon completion of this unit, the student should be able to define, explain, symbolize, and/or illustrate the following:

| | | |
|---------------------------------------|--------------------|-----------------------|
| square root | cube root | n^{th} roots |
| principal n^{th} root of a | index | radical symbol |
| radicand | perfect squares | perfect cubes |
| rational exponents | exponent rules | simplify radicals |
| Distance formula | Midpoint Formula | radical expressions |
| rationalizing denominators | conjugates | extraneous solution |
| imaginary unit i | complex number | imaginary number |
| powers of i | complex conjugates | i -form |

Upon completion of this unit, the student should be able to:

1. Find Square Roots, Cube Roots, n^{th} Roots

2. Find Function Values of Radical Functions
3. Use the rules for exponents to evaluate and/or simplify expressions that contain rational exponents
5. Evaluate radical functions and find the domains of radical functions
6. Use Rational Exponents to Simplify Radical Expressions
7. Use the Distance and Midpoint Formulas
8. Add and subtract Radical Expressions
9. Multiply radical expressions using the Distributive Property or the FOIL method
10. Rationalize Denominators having one or two terms
11. Solve Equations that contain Radical Expressions
12. Identify extraneous solution(s) to Radical Equations
13. Solve application problems involving radical equations
14. Write the square roots of negative numbers in i – form and perform operations on numbers in i – form
15. Determine the equality of two complex numbers
16. Add, subtract, and multiply complex numbers
17. Divide complex numbers by using the complex conjugates
18. Find Powers of i

Unit V – Chapter 8: Quadratic Equations and Functions

Objectives: Upon completion of this unit, the student should be able to define, explain, symbolize, and/or illustrate the following:

extracting square roots
 Quadratic Formula
 quadratic inequality
 quadratic functions
 vertex of a parabola
 $f(x) = a(x-h)^2 + k$
 zeros/critical numbers

completing the square
 The Discriminant
 standard form
 parabola
 axis of symmetry
 intercepts
 test intervals

Upon completion of this unit, the student should be able to:

1. Use the Square Root Property to Solve Quadratic Equations
2. Solve Quadratic Equations by Completing the Square
3. Solve Problems Modeled by Quadratic Equations
4. Solve Quadratic Equations by using the Quadratic Formula
5. Determine the number and type of solutions of a Quadratic Equation by using the Discriminant
6. Solve Polynomial Inequalities of Degree 2 or greater

7. Graph Quadratic Functions

8. Find the Vertex and Axis of Symmetry from the graph of a Parabola
 9. Write Quadratic Functions in the form, $y = a(x-h)^2 + k$
 10. Find the Vertex of the graph of $f(x) = ax^2 + bx + c$ using $x = -b/2a$
-

Time Guideline

NOTE: For those students needing a review of basic algebra skills, it is strongly recommended that Chapter 1 be used for this purpose.

Week # 1: Introduction to the Course/**Chapter 3:** Graphs and Functions

1. **Pre-test** (score should be at least 14 correct out of 20, or 70%)
Recommended Assignment: (Review of Algebra Skills):
Chapter 1, Pg. 73,4 # 1-31 odd and
Chapter 2, Page 158,9 #1-21 odd, 33-39 odd
 2. Section 3.1 – Graphing Linear Equations
Recommended Assignment: Pgs. 176-179 # 1-7 odd, # 11-43 odd
 3. Section 3.2 – The Slope of a Line
Recommended Assignment: Pgs.192-194 # 1-67 odd
-

- Week # 2:**
1. Section 3.3 – The Slope-Intercept Form
Recommended Assignment: Pgs. 201-3 # 1-27 odd
 2. Section 3.4 – More Equations of Lines
Recommended Assignment: Pgs. 210-212 # 1-57 odd
 3. Section 3.6 – Introduction to Functions
Recommended Assignment: Pgs. 230-233 # 1-17 odd, #23-57 odd
-

- Week # 3:**
1. Section 3.7 – Finding Domains and Ranges from Graphs and Graphing Piecewise-Defined Functions
Recommended Assignment: Pgs. 240-2 # 1-31 odd
 2. Section 3.8 – Shifting and Reflecting Graphs of Functions
Recommended Assignment: Pgs. 249-251 # 1-31 odd
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- Week # 4:**
1. Review of Unit I, Chapter 3

Recommended Assignments: Pgs. 253-265;

Pgs. 266-9 # 1-21 odd, #26-33 all

2. **Test # 1** – Chapter 3 (all but 3.5)

3. **Unit II – parts of Chapters 2, 3.5, and 4:** Linear Inequalities; Systems of Linear Equations and Inequalities

Section 2.4 – Linear Inequalities and Problem Solving

Recommended Assignment: Pgs. 119-121 # 11-69 odd

4. Section 2.5 – Sets and Compound Inequalities

Recommended Assignment: Pgs. 132-134 # 13-63 odd

Week # 5: 1. Section 2.6 – Absolute Value Equations

Recommended Assignment: Pgs. 140-1 # 1-67 odd

2. Section 2.7 – Absolute Value Inequalities

Recommended Assignment: Pgs. 147-150 # 1-81 odd

3. Section 3.5 – Graphing Linear Inequalities in Two Variables

Recommended Assignment: Pgs. 220,1 # 1-25 odd

4. Section 4.1 – Solving Systems of Linear Equations in Two Variables by graphing

Recommended Assignment: Pgs. 283-5 # 1-15 odd

Week # 6: 1. Section 4.1 – Solving Systems of Linear Equations in Two Variables

Recommended Assignment: Pgs. 283-5 # 17-39 odd

2. Section 4.5 – Graphing Systems of Linear Inequalities

Recommended Assignment: Pgs. 320,1 # 1-23 odd

3. Review of Unit II

Recommended Assignment: Pgs.159-161 # 47-52, 57-64, 67-84 all,
Pg. 262 # 55-61 odd, Pgs. 329-332 #1-5 all, 39-44 all

4. **TEST # 2 – parts of Chapters 2 and 4, 3.5**

Recommended Assignment as review: Pg. 356 # 49-69 odd

- Week # 7:**
1. **Unit III – parts of Chapters 5 and 6:** Factoring; Rational Functions and Rational Expressions
Section 5.4 – Greatest Common Factor & Factoring by Grouping
Recommended Assignment: Pgs. 374,5 # 1-61 odd
 2. Section 5.5 – Factoring Trinomials
Recommended Assignment: Pgs. 384,5 # 1-33 odd, # 43-87 odd
 3. Section 5.6 – Factoring by Special Products
Recommended Assignment: Pgs. 391,2 # 1-47 odd
 4. Section 5.7 – Solving Equations by Factoring and Solving Problems
Recommended Assignment: Pgs. 404-406 # 1-77 odd
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- Week # 8:**
1. Chapter 6 – 6.1: Rational Functions; Multiplying & Dividing Rationals
Recommended Assignment: Pgs. 432-4 # 1-55 odd
 2. Section 6.2 – Adding & Subtracting Rational Expressions
Recommended Assignment: Pgs. 442-4 # 1-55 odd
 3. Section 6.3 – Simplifying Complex Fractions
Recommended Assignment: Pgs. 451,2 # 1-33 odd
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- Week # 9:**
1. Review of Unit III – parts of Chapters 5 and 6
Recommended Assignments: Pg. 418,9 # 10-23 and Pg. 496 # 1-20
 2. **TEST # 3 (parts of Chapters 5 and 6)**
 3. **Unit IV, Chapter 7:**Rational Exponents, Radicals, and Complex Numbers
Section 7.1- Radical Expressions and Radical Functions
Recommended Assignment: Pgs. 507,8 # 1-89 odd
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- Week # 10:**
1. Section 7.2 – Rational Exponents

Recommended Assignment: Pgs. 515,16 # 1-79 odd

2. Section 7.3 – Simplifying Radical Expressions; Using Distance and Midpoint Formulas
Recommended Assignment: Pgs. 524-526 # 1-93 odd
3. Section 7.4 – Adding, Subtracting, and Multiplying Radical Expressions
Recommended Assignment: Pgs. 531-533 # 1-69 odd

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- Week # 11:**
1. Section 7.5 – Rationalizing the **Denominator** of Radical Expressions
Recommended Assignment: Pgs. 539,40 # 1-43 odd
 2. Section 7.6 – Radical Equations and Problem Solving
Recommended Assignment: Pgs. 550-2 # 1-61 odd
 3. Section 7.7 – Complex Numbers
Recommended Assignment: Pgs. 561,2 # 1-75 odd

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- Week # 12:**
1. Review of Unit IV
Recommended Assignment: Pgs. 572,3 # 1-13, 15-38
 2. **Test # 4 – Chapter 7**
 3. **Unit V – Chapter 8**
Section 8.1 – Solving Quadratic Equations using Square Root Property and by Completing the Square
Recommended Assignment: Pgs. 585,6 # 1-49 odd
 4. Section 8.2 – Solving Quadratic Equations by using the Quadratic Formula
Recommended Assignment: Pg. 597 #1-10 and Pg. 598 # 23-33 odd,
41-49 odd

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- Week # 13:**
1. Section 8.4 – Nonlinear Inequalities in one variable
Recommended Assignment: Pgs. 620,1 # 1-13 odd, 27, 29, 33, 35
 2. Section 8.5 – Quadratic Functions and their Graphs
Recommended Assignment: Pgs. 630-632 # 1-27 odd

Week # 13 Continued:

3. Section 8.6 – Further Graphing of Quadratic Functions
Recommended Assignment: Pgs. 641,2 # 1-7 odd, 13, 15, 17
 4. Review of Unit V – Chapter 8 (not 8.3)
Recommended Assignment: Pgs.654,5 # 1-6, 11-14, 17-20
-

Week # 14: 1. **Test # 5 - Chapter 8 (not 8.3)**

- Recommended Assignment: Final Exam Review in syllabus
2. Go over Final Exam Review and review Chapter Tests/Sample Tests
 3. Fall semesters: *Companion to the ACCUPLACER test* (1 hour) given to all classes.
-

Week # 15: **FINAL EXAM: (comprehensive)**

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Determine whether the ordered pair is a solution of the given linear equation.

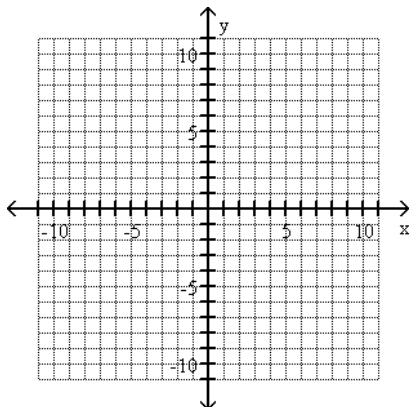
1) $4x + 5y = -18$; $(-2, 2)$

1) _____

Graph the linear equations.

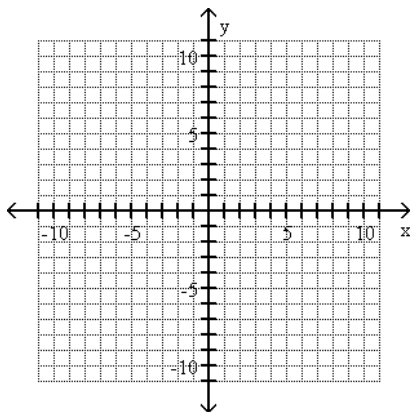
2) $-2x - y = 4$

2) _____



3) $x = \frac{1}{2}$

3) _____



4) Find the slope of the line that passes through $(-6, -4)$ and $(-1, -6)$.

4) _____

5) Find the slope and the y-intercept of the line $5x + 3y = -1$.

5) _____

Determine whether the lines are parallel, perpendicular, or neither.

6) $-5x + 7y = 3$
 $7x + 5y = 35$

6) _____

Solve the problem.

7) Find the slope of a line parallel to the line $y = -\frac{4}{5}x + 5$.

7) _____

Use the slope-intercept form of the linear equation to write the equation of the line with the given slope and y-intercept.

8) Slope $\frac{5}{2}$; y-intercept (0, -5)

8) _____

Write an equation of the line with the given slope and containing the given point. Write the equation in the slope-intercept form $y = mx + b$.

9) Slope -3; through (-2, -3)

9) _____

Write an equation of the line passing through the given points. Write the equation in standard form $Ax + By = C$.

10) (-5, -3) and (4, -7)

10) _____

Write an equation of the line. Write the equation in the form $x = a$, $y = b$, or $y = mx + b$.

11) Through (-4, 1); perpendicular to $y = -3x + 1$

11) _____

12) Through (7, -6); parallel to $9x + 2y = 69$

12) _____

13) Through (-12, -3); parallel to $y = 4$

13) _____

Determine whether the relation is also a function.

14) $\{(-3, -8), (-1, 1), (4, 3), (4, -2)\}$

14) _____

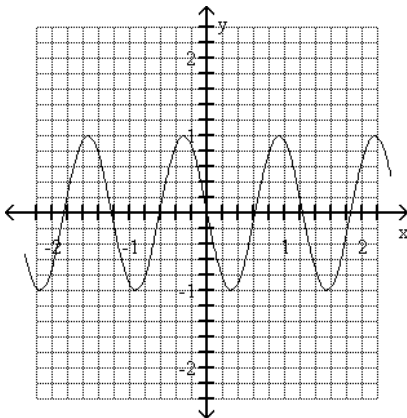
15) $y = -3x - 6$

15) _____

Use the vertical line test to determine whether the graph is the graph of a function.

16)

16) _____



Find the function value.

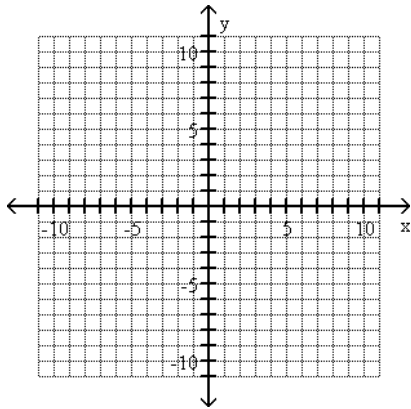
17) Find $f(-4)$ when $f(x) = 5x^2 + 5x - 1$.

17) _____

Graph the linear functions.

18) $f(x) = 6$

18) _____



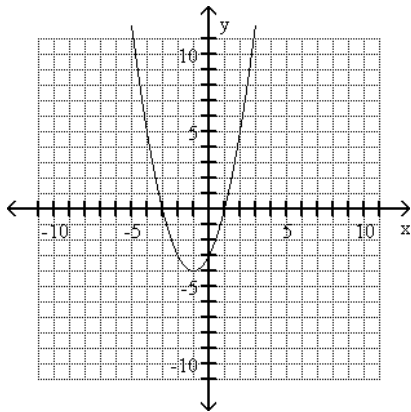
19) $f(x) = -2x - 6$

19) _____

Find the domain and the range of the function.

20)

20) _____

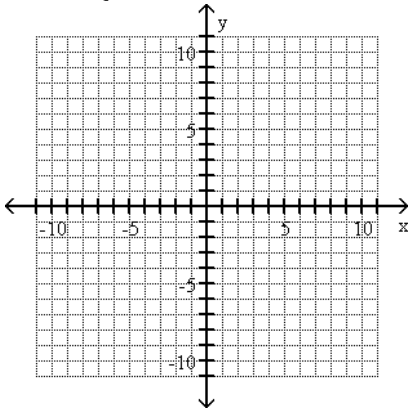


Graph the piecewise defined function.

21)

$$f(x) = \begin{cases} 3x - 1 & \text{if } x \leq 1 \\ -x & \text{if } x > 1 \end{cases}$$

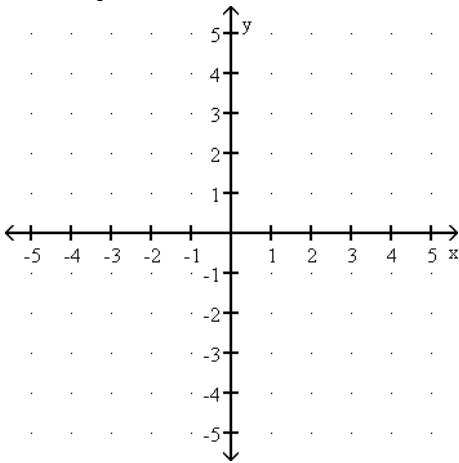
21) _____



Graph the function. State the domain and range of the function.

$$22) f(x) = \begin{cases} 3x + 2 & \text{if } x > 0 \\ 2 & \text{if } x \leq 0 \end{cases}$$

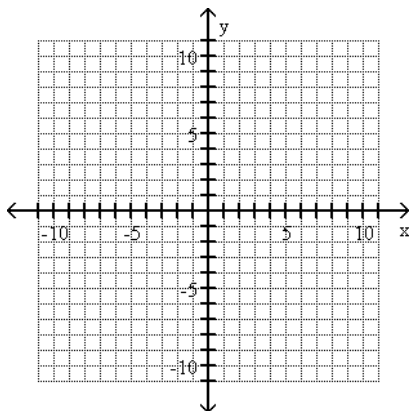
22) _____



Graph the functions.

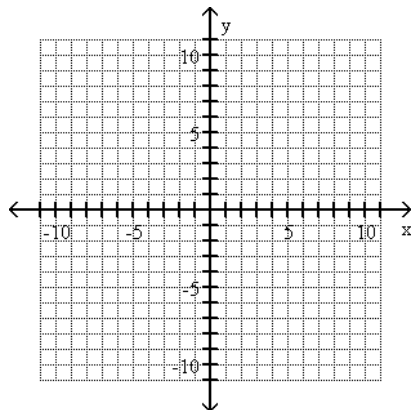
$$23) f(x) = \sqrt{x - 4}$$

23) _____



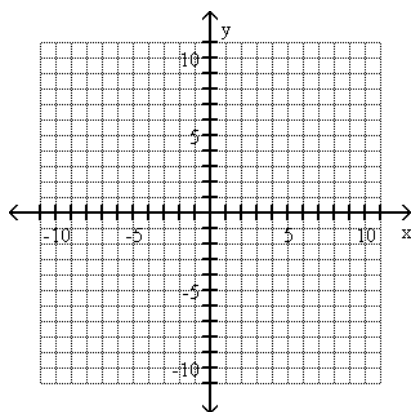
24) $f(x) = (x + 6)^2 + 1$

24) _____



25) $f(x) = -|x - 5|$

25) _____



Mth 095: Sample Test 2 (Unit II)

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Write the solution set using interval notation.

1) $-30 - 6x \leq 6$ 1) _____

2) $3(3x + 2) - 26 \leq 5x - 4$ 2) _____

Solve the compound inequality. Give the answer in interval notation.

3) $-19 \leq -2x - 5 < -11$ 3) _____

4) $\frac{2}{7}x + 1 \leq 0$ or $-4x < -8$ 4) _____

Solve.

5) A student scored 75, 77, and 99 on three algebra tests. What must he score on the fourth test in order to have an average grade of at least 85? 5) _____

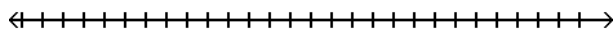
6) $\left| \frac{11x + 44}{4} \right| = 11$ 6) _____

7) $|5x + 9| + 15 = 8$ 7) _____

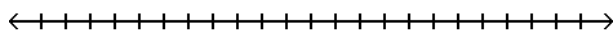
8) $|-3x - 7| = |8 - 7x|$ 8) _____

Solve the inequality. Then graph the solution set and write it in interval notation.

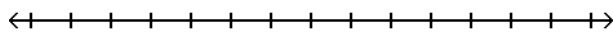
9) $|x - 7| + 5 \leq 12$ 9) _____



10) $\left| \frac{7y + 28}{4} \right| < 7$ 10) _____

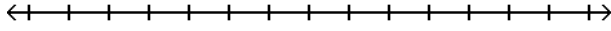


11) $|4k - 5| > -4$ 11) _____



12) $|3k - 2| - 1 > 5$

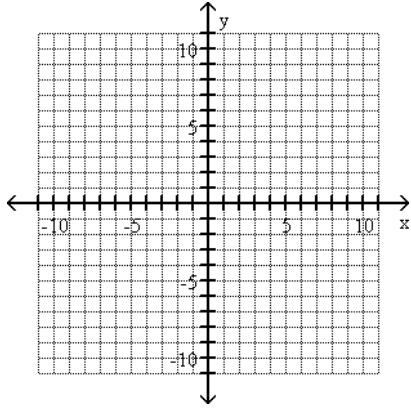
12) _____



Graph the inequality.

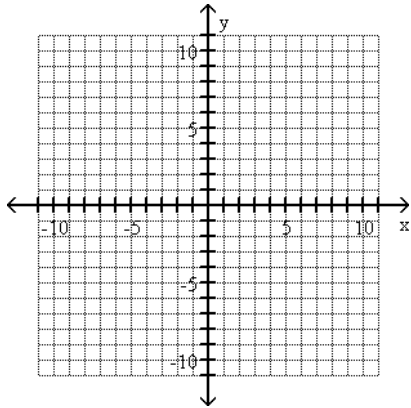
13) $3x - 2y < -6$

13) _____



14) $-3x + y \leq 6$

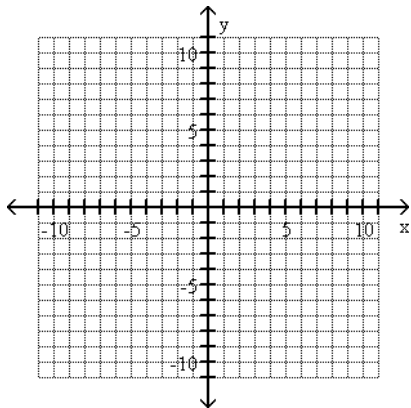
14) _____



Graph the union or intersection, as indicated.

15) The intersection of $x + y \leq 5$ and $x - y \geq 3$

15) _____



Determine whether the ordered pair is a solution of the system of linear equations.

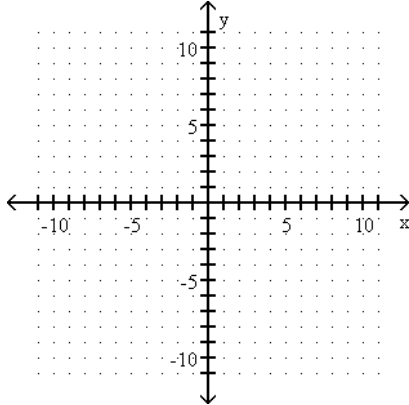
16) $(6, 5), \begin{cases} 4x + y = 29 \\ 3x + 4y = 38 \end{cases}$

16) _____

Solve the system by graphing.

17) $\begin{cases} 6x + y = 0 \\ -6x + y = -12 \end{cases}$

17) _____



Solve the system of equations by the substitution method.

18) $\begin{cases} x - 6y = -5 \\ 8x - 5y = -40 \end{cases}$

18) _____

Solve the system of equations by the elimination method.

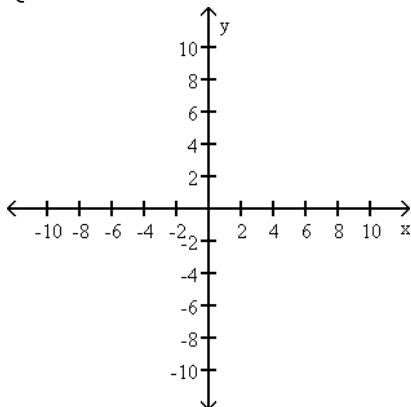
19) $\begin{cases} 7x + 8y = -3 \\ 4x + 3y = -8 \end{cases}$

19) _____

Graph the solution of the system of linear inequalities.

20) $\begin{cases} y \leq 3x + 3 \\ y > -2x \end{cases}$

20) _____



Mth 095: Sample Test 3 (Unit III)

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Factor out the greatest common factor.

1) $x(x^2 + 13) - 6(x^2 + 13)$ 1) _____

2) $32x^6y^7 - 96x^4y^5 + 144x^2y^2$ 2) _____

Factor the polynomials completely.

3) $20x^2 - 24xy - 15x + 18y$ 3) _____

4) $8x^2 - 8x - 48$ 4) _____

5) $10x^2 - 19x + 6$ 5) _____

6) $12x^2 - 52x - 40$ 6) _____

7) $49x^2y^2 - 56x^2y + 16x^2$ 7) _____

8) $9 - 25x^2$ 8) _____

9) $x^4 - 16$ 9) _____

10) $125x^3 + y^3$ 10) _____

11) $512x^3 - 729$ 11) _____

Solve the equations.

12) $64x^2 + 80x + 25 = 0$ 12) _____

13) $x^3 - x = -8x^2 + 8$ 13) _____

Solve.

14) If the cost, $C(x)$, for manufacturing x units of a certain product is given by $C(x) = x^2 - 50x + 8400$, find the number of units manufactured at a cost of \$13,400. 14) _____

- 15) A window washer accidentally drops a bucket from the top of a 64-foot building. After t seconds, the height $h(t)$ is given by the function $h(t) = -16t^2 + 64$. Find how long it takes the bucket to hit the ground. 15) _____

Find the domain of the rational function.

16) $f(x) = \frac{1 - 2x}{x^2 - 18x + 77}$ 16) _____

Simplify the rational expressions.

17) $\frac{4 - 2x}{10 - 5x}$ 17) _____

18) $\frac{x^3 - 216}{6 - x}$ 18) _____

Multiply and simplify.

19) $\frac{x^3 + x^2y + 3x + 3y}{3x^4 + 9x^2} \cdot \frac{20x^3}{5x^2 - 5y^2}$ 19) _____

Divide and simplify.

20) $\frac{2x^2 - 2x - 24}{5x^2 - 35x + 60} \div \frac{x^2 - 7x + 12}{x^2 - 6x + 9}$ 20) _____

Perform the indicated operation. Simplify if possible.

21) $\frac{10x - 5}{x^2 - 9x + 14} + \frac{-2 - 9x}{x^2 - 9x + 14}$ 21) _____

22) $\frac{7}{3x + 9} + \frac{5}{4x + 12}$ 22) _____

23) $\frac{x}{x^2 - 16} - \frac{5}{x^2 + 5x + 4}$ 23) _____

Simplify.

24)

$$\frac{\frac{x}{25} - \frac{1}{x}}{1 + \frac{5}{x}}$$

24) _____

25)

$$\frac{6 - \frac{a}{b}}{\frac{a^2}{b^2} - 36}$$

25) _____

Mth 095: Sample Test 4 (Unit IV)

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

1) $\sqrt{16x^{18}}$ 1) _____

2) $\sqrt{\frac{25z^{26}}{121}}$ 2) _____

3) $\sqrt[3]{\frac{x^{12}}{64y^6}}$ 3) _____

4) $-\sqrt[3]{-64x^{12}y^{24}}$ 4) _____

Find the root. Assume that all variables represent nonnegative real numbers.

5) $\sqrt[3]{x^{30}}$ 5) _____

6) $-\sqrt[4]{81x^{12}y^8}$ 6) _____

7) $\sqrt[7]{x^{21}}$ 7) _____

8) If $f(x) = \sqrt[3]{x-1}$, find the value of $f(-7)$. 8) _____

Use radical notation to write the expression. Simplify if possible.

9) $(-32x^{20})^{1/5}$ 9) _____

10) $(-27)^{4/3}$ 10) _____

11) $81^{5/4}$ 11) _____

Write with positive exponents. Simplify if possible.

12) $32^{-4/5}$ 12) _____

13) $64^{-4/3}$ 13) _____

Use the properties of exponents to simplify. Write with positive exponents.

14) $\frac{81^{3/4}}{81^{1/4}}$ 14) _____

15) $\frac{x^{1/7} \cdot x^{5/3}}{x^{3/2}}$ 15) _____

16) $\frac{x^{-1/2}y^{3/8}}{(x^4y^{-5})^{-1/2}}$ 16) _____

Use the product rule to multiply. Assume all variables represent positive real numbers.

17) $\sqrt{15x^3} \cdot \sqrt{15x^5}$ 17) _____

Use the quotient rule to divide and simplify.

18) $\sqrt{\frac{18x^2y}{25}}$ 18) _____

Simplify. Assume that all variables represent positive real numbers.

19) $\sqrt{72}$ 19) _____

20) $\sqrt[3]{-8a^8b^{10}}$ 20) _____

21) $\frac{\sqrt{189x^5y^6}}{\sqrt{3y^4}}$ 21) _____

Find the distance between the pair of points.

22) (-7, -5) and (-5, 3) 22) _____

Find the midpoint of the line segment whose endpoints are given.

23) (-9, 2), (-4, -6) 23) _____

Add or subtract. Assume all variables represent positive real numbers.

24) $12\sqrt[3]{2} - 3\sqrt[3]{54}$ 24) _____

25) $\sqrt{24} - 3\sqrt{54} - 2\sqrt{96}$ 25) _____

26) $10\sqrt[4]{x^7} - 4x\sqrt[4]{x^3}$ 26) _____

Multiply, and then simplify if possible. Assume all variables represent positive real numbers.

27) $\sqrt{5}(\sqrt{15} + \sqrt{5})$ 27) _____

28) $(2\sqrt{13} + 3)(2\sqrt{13} + 9)$ 28) _____

29) $(\sqrt{7} + 2)(\sqrt{7} - 2)$ 29) _____

30) $(6\sqrt{2} - 2)^2$ 30) _____

Rationalize the denominator and simplify. Assume that all variables represent positive real numbers.

31) $\frac{13}{\sqrt[3]{7}}$ 31) _____

32) $\frac{21}{\sqrt{3x}}$ 32) _____

33) $4\sqrt{\frac{16}{125}}$ 33) _____

34) $\frac{7}{8 - \sqrt{2}}$ 34) _____

35) $\frac{\sqrt{7} - \sqrt{8}}{\sqrt{7} + \sqrt{8}}$ 35) _____

Solve.

36) $\sqrt{5x + 7} - 9 = 0$ 36) _____

37) $x - \sqrt{20x - 60} = -2$ 37) _____

38) $\sqrt[3]{3x - 4} = \sqrt[3]{x + 12}$ 38) _____

39) $\sqrt{2x + 3} = 1 + \sqrt{x + 1}$ 39) _____

Write in terms of i.

40) $\sqrt{-180}$ 40) _____

Multiply or divide.

41) $\sqrt{3} \cdot \sqrt{-27}$

41) _____

42) $\frac{\sqrt{4}}{\sqrt{-3}}$

42) _____

Perform the indicated operation. Write the result in the form $a + bi$.

43) $(5 + 4i) - (-9 + i)$

43) _____

44) $(7 - 5i) + (5 + 8i)$

44) _____

45) $(-13i)(-2i)$

45) _____

46) $(2 - 4i)^2$

46) _____

47) $(5 - 15i)(3 - i)$

47) _____

48) $\frac{1 - 12i}{-4i}$

48) _____

49) $\frac{5 + 6i}{5 - 6i}$

49) _____

Find the power of i .

50) i^{48}

50) _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Use the square root property to solve the equation.

1) $x^2 - 22 = 0$ 1) _____

2) $2x^2 + 26 = 0$ 2) _____

3) $(x + 6)^2 = 20$ 3) _____

Add the proper constant to the binomial so that the resulting trinomial is a perfect square trinomial.

Then factor the trinomial.

4) $y^2 - 18y$ 4) _____

Solve the equation by completing the square.

5) $x^2 + 4x = 16$ 5) _____

6) $x^2 + 12x = -15$ 6) _____

7) $x^2 + x + 2 = 0$ 7) _____

Use the quadratic formula to solve the equation.

8) $x^2 - 6x + 45 = 0$ 8) _____

9) $4x^2 = -10x - 3$ 9) _____

10) $6x^2 + 12x = -1$ 10) _____

Use the discriminant to determine the number and type of solutions of the equation.

11) $x^2 - 8x - 1 = 0$ 11) _____

12) $6x^2 = -3x - 2$ 12) _____

Solve the inequality. Write the solution set in interval notation.

13) $x^2 + 10x + 24 > 0$ 13) _____

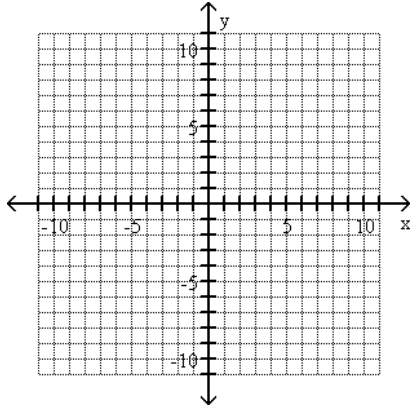
14) $-2x^2 + 6x \geq 0$ 14) _____

15) $3x^2 - 5x \geq 8$ 15) _____

Sketch the graph of the quadratic function. Give the vertex and axis of symmetry.

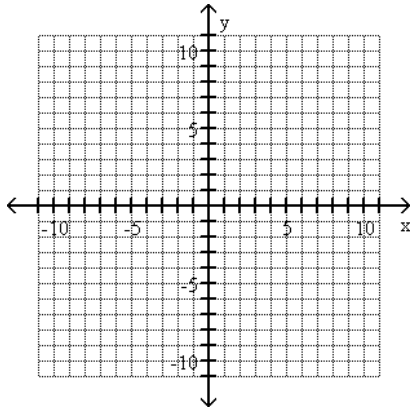
16) $f(x) = x^2 - 3$

16) _____



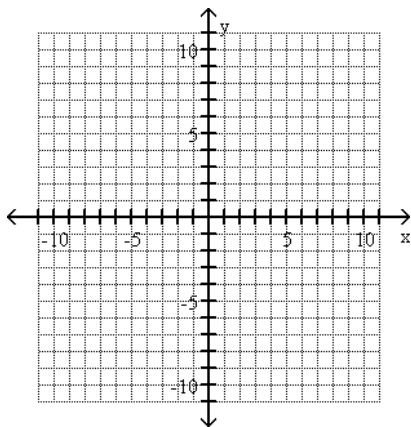
17) $f(x) = (x - 2)^2$

17) _____



18) $f(x) = (x + 1)^2 - 9$

18) _____



Find the vertex of the graph of the quadratic function.

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

19) _____

Find the vertex of the graph of the quadratic function. Find any intercepts and graph the function.

20) $f(x) = x^2 - 2x - 8$

20) _____

