

## MTH 104/099 Intermediate Algebra with Trigonometry with a Review of Elementary Algebra

### Course Objectives

Creating open expressions and using those expressions to write equations involving one or two variables to solve problems and applications will be integrated throughout this course (especially in \* topics). Examples from other disciplines will be incorporated whenever possible. A comprehensive departmental final exam testing the degree of mastery of the following course objectives is required. MTH 099 review objectives are denoted by [099].

#### 1. Sets of Numbers

- 1.1 Review the classification of a given real number as being a counting or natural number, whole number, integer, rational or irrational number. [099]
- 1.2 Understand and demonstrate the use of imaginary and complex numbers.
- 1.3 Write complex numbers in  $a + bi$  form; add, subtract, multiply and divide complex numbers in  $a + bi$  form.

#### 2. Properties of Real Numbers

- 2.1 Review the use of the Commutative, Associative, Distributive, Identity, and Inverse Properties.

#### 3. Operations on Real Numbers

- 3.1 Review arithmetic operations on rational numbers.
- 3.2 Evaluate a given expression by applying the correct priority of operations. [099]

#### 4\*. Equation Solving Techniques

- 4.1 Solve linear equations in one variable. [099]
- 4.2 Solve literal equations and formulas for a single variable. [099]
- 4.3. Solve quadratic equations in one variable:
  - 4.3.a. Solving by factoring. [099]
  - 4.3.b. Solve by using the square root method.
  - 4.3.c. Solve by completing the square where  $a = 1$ .
  - 4.3.d. Derive the quadratic formula.
  - 4.3.e. Solve by the quadratic formula.
  - 4.3.f. Use the discriminant to classify the roots.
- 4.4 Solve rational equations.
- 4.5 Solve radical equations involving one radical term.

#### 5. Polynomials

- 5.1 Add and subtract polynomials. [099]
- 5.2 Multiply polynomials. [099]
- 5.3 Divide a polynomial by a monomial. [099]
- 5.4 Divide a polynomial by a binomial using long division. [099]

#### 6. Factoring

- 6.1 Factor a monomial GCF from a polynomial. [099]
- 6.2 Factor a polynomial containing four terms by grouping. [099]
- 6.3 Factor the difference of two squares. [099]
- 6.4 Factor trinomials of the form  $ax^2+bx+c$ . [099]
- 6.5 Factor perfect square trinomials. [099]
- 6.6 Factor the sum and difference of two cubes.

## MTH 104/099 Course Objectives – 2

### 7. Rational Expressions

- 7.1 Simplify rational expressions. [099]
- 7.2 Multiply and divide rational expressions. [099]
- 7.3 Add and subtract rational expressions with like denominators. [099]
- 7.4 Add and subtract rational expressions with unlike denominators.
- 7.5 Simplify complex fractions.

### 8\*. Inequalities in one variable

- 8.1 Solve a linear inequality in one variable, and express the solution using set notation and interval notation and by graphing. [099]
- 8.2 Solve compound linear inequalities, and express the solution using set notation and interval notation and by graphing. [099]

### 9. Absolute Value

- 9.1 Review the concept of absolute value as distance from zero on the real number line.
- 9.2 Solve a linear absolute value equation in one variable.
- 9.3 Solve a linear absolute value inequality in one variable and express the solution using set notation and interval notation and by graphing.

### 10. Functions

- 10.1 Demonstrate the use of function notation.

### 11. The Cartesian Coordinate System

- 11.1 Review the use of the Cartesian coordinate system to describe the  $x$  – and  $y$  –axes, the origin and quadrants, and determine the positions of ordered pairs.
- 11.2 Graph linear equations in two variables by plotting points. [099]
- 11.3 Determine the  $x$  – and  $y$  –intercepts and use them to graph a linear equation. [099]
- 11.4 Understand the concept of the slope of a line and use the slope formula to determine the slope of the line through two given points. [099]
- 11.5 Determine the slopes of horizontal, vertical, parallel and perpendicular lines. [099]
- 11.6 Graph linear equations in two variables using the slope-intercept method. [099]
- 11.7 Write the equation of a line using the slope-intercept form and the point-slope form.
- 11.8 Given two points in the coordinate plane, calculate the distance between them using the distance formula. [099]
- 11.9 Find the midpoint of the line segment joining two points in the coordinate plane using the midpoint formula. [099]
- 11.10 Graph linear inequalities in two variables.
- 11.11 Use the vertex, axis of symmetry, and intercepts to graph a quadratic equation of the form  $y = ax^2 + bx + c$  .

### 12\*. Systems of Equations

- 12.1 Solve systems of linear equations in two variables graphically and algebraically. [099]
- 12.2 Solve a system of three linear equations in three variables algebraically.

## **MTH 104/099 Course Objectives – 3**

### **13. Exponents and Radicals**

- 13.1 Simplify exponential expressions with integer exponents. [099]
- 13.2 Simplify exponential expressions with rational exponents.
- 13.3 Simplify square root radical expressions. [099]
- 13.4 Simplify cube root radical expressions.
- 13.5 Perform arithmetic operations on square root and cube root radical expressions.

### **14. Geometry Topics**

- 14.1 Review area and perimeter of triangles, squares, and rectangles.
- 14.2 Review radius, diameter, circumference and area of circles.
- 14.3 Review complementary, supplementary and vertical angles.
- 14.4 Review sum of angles of triangles and angles of parallelograms.
- 14.5 Review using proportions to solve problems involving similar triangles.
- 14.6 Identify the alternate interior angles, alternate exterior angles and corresponding angles formed when two parallel lines are cut by a transversal. [099]
- 14.7 Find unknown angle measures using alternate interior angles, alternate exterior angles and corresponding angles formed when two parallel lines are cut by a transversal. [099]

### **15\*. Right Triangle Trigonometry**

- 15.1 Review the use of the Pythagorean Theorem.
- 15.2 State the sine, cosine, and tangent ratios in terms of opposite side, adjacent side and hypotenuse of a right triangle.
- 15.3 Use special right triangles to find sine, cosine, and tangent ratios of special angles (30,45,60 degrees).
- 15.4 Find any angle or side of a right triangle given one acute angle and one side, or two sides.
- 15.5 Solve realistic applications involving right triangles