

MTH 104 Course Objectives:

MTH 104 INTERMEDIATE ALGEBRA (revised 10/2013) – EFFECTIVE SPRING 2015

A comprehensive departmental final exam testing the degree of mastery of the following course objectives is required.

1. Sets of Numbers

- 1.1 Introduce the concept of imaginary and complex numbers.
- 1.2 Write complex numbers in $a + bi$ form; add, subtract, multiply, and divide complex numbers in $a + bi$ form.

2. Equation Solving Techniques

- 2.1 Review solving literal equations and formulas for a single variable.
- 2.2 Solve quadratic equations in one variable.
 - 2.2a Review solving by factoring.
 - 2.2b Solve by using the square root method.
 - 2.2c Solve by completing the square where $a = 1$.
 - 2.2d Solve by the quadratic formula.
 - 2.2e Use the discriminant to classify the roots.
- 2.3 Solve rational equations.
- 2.4 Solve radical equations involving one radical term.

3. Rational Expressions

- 3.1 Review the following factoring techniques: a monomial GCF from a polynomial (Section 6.1), a polynomial containing four terms by grouping (Section 6.2), the difference of two squares, trinomials of the form $ax^2 + bx + c$, perfect square trinomials.
- 3.2 Factor the sum and difference of two cubes.
- 3.3 Simplify rational expressions.
- 3.4 Multiply and divide rational expressions.
- 3.5 Add and subtract rational expressions.
- 3.6 Simplify complex fractions.

4. Functions

- 4.1 Determine if relations written as a correspondence between sets and as a set of ordered pairs are functions.
- 4.2 Determine the domain and range of a set of ordered pairs.
- 4.3 Determine the domain and range of a graph, expressing the results in interval notation.
- 4.4 Use the vertical line test to determine if a graph represents a function.
- 4.5 Introduce function notation and evaluate functions at specific values of the independent variable.

5. The Cartesian Coordinate System

- 5.1 Review graphing linear equations using the slope and y-intercept.
- 5.2 Use the vertex, axis of symmetry, and intercepts to graph a quadratic equation of the form $y = ax^2 + bx + c$.

6. Systems of Equations

- 6.1 Review solving systems of linear equations in two variables algebraically.
- 6.2 Solve a system of three linear equations in three variables algebraically.
- 6.3 Solve linear-quadratic systems in two variables of the form $y = ax^2 + bx + c$ algebraically and verify the solution graphically.
- 6.4 Solve systems of two quadratic equations in two variables of the form $y = ax^2 + bx + c$ algebraically and verify the solution graphically.

7. Exponents and Radicals

- 7.1 Review simplifying exponential expressions with integer exponents.
- 7.2 Simplify exponential expressions with rational exponents.
- 7.3 Simplify square root and cube root radical expressions.
- 7.4 Perform arithmetic operations on square root and cube root radical expressions.

8. Trigonometry

- 8.1 Review the use of the Pythagorean Theorem.
- 8.2 State the sine, cosine, and tangent ratios in terms of opposite side, adjacent side and hypotenuse of a right triangle.
- 8.3 Find any angle or side of a right triangle given one acute angle and one side, or two sides.

9. Applications

Creating open expressions and using those expressions to write equations involving one or two variables to solve applications will be integrated throughout this course. Examples from other disciplines will be incorporated whenever possible. The following types of applications are required.

- 9.1 Review systems of two linear equations solved algebraically including simple interest, motion problems, number problems, and mixture problems involving money and percent.
- 9.2 Systems of three linear equations solved algebraically.
- 9.3 Geometric formulas including area of rectangles, squares, triangles, and circles.
- 9.4 Number problems solved with a rational equation and a quadratic equation.
- 9.5 Work problems.
- 9.6 Motion problems solved with a rational equation involving two rates.
- 9.7 Radical equations involving one radical term.
- 9.8 Evaluating functions including determining the maximum and minimum of quadratic functions.
- 9.9 Solve right triangles.