University of Colorado Denver
Math 1110 Topics
Updated: Fall 2009
Reviewed by Lance Lana and and Nathan Kurtz

1. Graphs, Solving Equations and Inequalities. (Review material so much of this is optional.)
    Rectangular coordinates (optional).
    Graph equations by hand by plotting points and with a graphing utility (optional).
    Solve equations graphically.
    Solve quadratic equations by factoring, square root method, completing the square, quadratic formula.
    Solve radical equations and absolute value equations algebraically.
    Solve linear inequalities and absolute value inequalities algebraically and graphically.

2. Graphs
    Find intercepts of linear and quadratic functions algebraically and graphically.
    Test an equation for symmetry with respect to the x-axis, y-axis and origin.
    Calculate and interpret slope of a line and write the equation of a line in slope-intercept form.
    Graph lines by hand given a point and the slope as well as graph lines written in general form.
    Find the equation of a line given a point and the slope of the line, or given two points on the line.
    Find the equation of vertical lines and horizontal lines.
    Find the equation of perpendicular lines and parallel lines.
    Write the standard form of the equation of a circle by completing the square and graph the circle.

3. Functions and Their Graphs
    Determine whether a relation represents a function
    Evaluate functions.
    Evaluate the difference quotient where f is linear as well as quadratic.

    Find the domain of where f is a polynomial, rational or root function.
    Form the sum, difference, product and quotient of two functions.
    Identify the graph of a function. Use the vertical-line test.
    Determine Even and Odd functions from a graph as well as from an equation.
    Use the graph of a function to determine where the function is increasing, decreasing or constant.
    Use the graph to locate local maxima and local minima
    Use a graphing utility to approximate local maxima and minima and to find increasing or decreasing intervals.
    Find the average rate of change of a function.

    Graph key functions "library of functions": , , , , , , , .
    Graph piecewise-defined functions by hand and with a graphing utility then evaluate.
    Transformations of functions: vertical and horizontal shifts, compressing, stretching, reflection.
    Mathematical modeling: geometric problems, maximizing area, maximizing volume, etc.

4. Linear and Quadratic Functions
    Use average rate of change to identify linear functions.
    Build linear models from verbal descriptions.
    Draw and interpret scatter diagrams.
    Distinguish between linear and nonlinear relations.
    Use a graphing utility to find the line of best fit by linear regression.
    Graph quadratic functions using transformations.
    Graph a quadratic function by hand by finding its vertex, axis of symmetry and intercepts.
    Find the maximum or minimum value of a quadratic function by finding the vertex (without technology).
    Build quadratic models from verbal descriptions as well as from data with technology by quadratic regression.

Solve quadratic inequalities graphically by hand and with a graphing utility.

5. Polynomial and Rational Functions
   - Identify polynomial functions and their degree.
   - Graph polynomial functions using transformations
   - Identify the real zeros of a factored polynomial function and their multiplicity.
   - Determine end behavior, intercepts, turning points, domain/range and sketch the graph of a factored polynomial.
   - Build cubic models from data with technology by cubic regression.
   - Find the domain of a rational function.
   - Find the vertical and horizontal asymptotes of a rational function.
   - Find oblique asymptotes (optional).
   - Analyze the graph of a rational function: find the domain, intercepts, asymptotes and graph by hand.
   - Solve applied problems involving rational functions.
   - Solve polynomial inequalities algebraically and graphically (optional).
   - Solve rational inequalities algebraically and graphically (optional).
   - Use the rational zeros theorem to list the potential rational zeros of a polynomial function.
   - Find the rational zeros of a polynomial function by synthetic division.
   - Find the complex zeros of a polynomial function.

6. Exponential and Logarithmic Functions
   - Form a composite function.
   - Find the domain of a composite function.
   - Determine whether a function is one-to-one.
   - Obtain the graph of the inverse function from the graph of the function.
   - Find the inverse of a function defined by an equation.
   - Evaluate and graph exponential functions.
   - Convert from exponential to logarithmic form and vice versa.
   - Evaluate simple logarithmic expressions without a calculator.
   - Determine the domain of a logarithmic function.
   - Work with properties of logarithms.
   - Use the change of base formula to evaluate logarithms.
   - Solve logarithmic equations algebraically and graphically.
   - Solve exponential equations algebraically and graphically.
   - Solve applications involving exponential growth and decay.
   - Build exponential and logarithmic models from data using regression.

7. Systems of Equations and Inequalities.
   - Solve systems of equations (up to 3 equations in 3 unknowns) by substitution and elimination.
   - Identify inconsistent systems.
   - Express the solution of a system of dependent equations.
   - Matrix solutions of linear systems (optional).
   - Matrix Algebra (optional)