### MAC 1105 - COURSE OBJECTIVES

**Primary homework problems are the on-line problems available at the russell eGrade site. (See Syllabus pg 2 for the web address.)**

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<th>Sec</th>
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<th>Course Objectives (Optional text homework problems are also listed.)</th>
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<td><strong>Updated for F’09</strong></td>
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<td></td>
<td>A5</td>
<td>P1: Understand the relationship between $a - b$ and $b - a$.</td>
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<td>Preliminary Objective P1: Factor quadratic trinomials</td>
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<td>1. Rational Expressions</td>
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<td>a. Equivalent Rational Expressions. (Class Examples)</td>
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<td>b. Multiply or divide rational expressions; simplify. (Sec A5: Example 2)</td>
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<td>c. Add or subtract rational expressions; simplify. (Sec A5: Examples 3-6)</td>
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<td>d. Simplify mixed quotient. (Sec A5: Example 7)</td>
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<td>A6</td>
<td>2. Understand the meaning of rational exponents; simplify numbers raised to rational exponents. (Sec A6: Example 7)</td>
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<td>3. Special Factoring Techniques</td>
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<td>a. Factor by grouping. (refer to your class notes; may also refer to Sec A3: Example 3f)</td>
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<td>b. Factor and simplify an expression containing rational exponents. (Sec A6: Example 10)</td>
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<td>c. Factor and simplify an expression containing rational exponents and a common binomial factor. (Class Examples)</td>
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<td>CN</td>
<td>4. Solve linear equations. (Refer to your class notes; may also refer to Sec A1: Examples 12)</td>
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<td>5. Solve quadratic equations (including Quadratic Formula). (Refer to your class notes; may also refer to Sec 1.3: Algebraic solution of Example 6; Sec A2: Example 3)</td>
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<td>6. Solve rational equations. (Class Examples)</td>
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<td>7. Solve higher order equations. Understand the existence of real number roots. (refer to your class notes; may also refer to Sec A1: Example 13a)</td>
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<td>8. Solve equations that contain even- or odd-root radicals. (Refer to your class notes; may also refer to Sec 1.3: Algebraic Solutions of Example 10)</td>
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<td>9. Inequalities</td>
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<td>a. Solve linear inequality. express the solution in interval notation. (Refer to your class notes; may also refer to Sec 1.5: Examples 7, 8)</td>
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<td>b. Express the solution to inequalities in interval notation. (Refer to your class notes; may also refer to Sec.1.5: Example 1)</td>
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<td>c. Express the solution to inequalities in interval notation and understanding the terms “or” and “and”. (Refer to your class notes.)</td>
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<td>10. Rectangular Coordinate System</td>
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<td>11. Understand plotting points on the Rectangular Coordinate System. (Sec 1.1: Figure 2, 3)</td>
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<td>12. Recall and use the distance formula. (Sec 1.1: Example 2)</td>
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<td>13. Recall and use the midpoint formula. (Sec 1.1: Example 5)</td>
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<td>14. General Graphing Principles</td>
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<td>a. Understand what it means for a point (a,b) to be on the graph of an equation. (Sec 1.2: Example 1,2,9,10)</td>
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<td>b. Identify intercepts from a graph or from an equation. (Sec 1.2: Example 4,5)</td>
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<td>c. Symmetry</td>
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<td>Given a point on a graph, give the coordinates of a point that must also be on the graph if the graph is symmetric with respect to the x-axis, y-axis, or origin. (Sec 1.2: Example 7)</td>
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<td>Algebraically determine if the graph of an equation has any symmetry. (Sec 1.2: Example 8)</td>
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### 1.6 Hwk 1-75 odd, 85, 87, 89
8. Linear Equations
   a. Calculate and interpret slope. (Sec 1.6: Example 1)
   b. Graph lines by hand by obtaining the x- and y-intercepts or any two points. (Sec 1.6: Example 2, 3)
   c. Identify the slope and y-intercept from the equation of a line. (Sec 1.6: Example 7)
   d. Write the equation of a horizontal or vertical line. (Sec 1.6: Example 3, 5)
   e. Write the equation of a line given two points on the line or given a point and the slope. (Sec 1.6: Example 4)
   f. Write the equation for a linear relationship described in an applications problem. (Class Examples)
   g. Write the equation of a line that goes through a given point that is parallel or perpendicular to a given line. (Sec 1.6: Example 9, 10, 11)

### 1.7 Hwk For 5, 7, 9, 11: Just write the standard form; 15, 17 (You will not be asked to complete the square and obtain the general form of the equation of a circle.)
9. Identify the center and radius and graph a circle when given the equation in standard (center-radius) form. (Sec 1.7: Examples 1,2)

### 2.1 Hwk 1, 3, 5, 9, For 13, 17, 19: add g) find f(3a); 21-32 all, 33, 35(omit c), 37-45 odd, 46, 47, 49-62 all, 67, 69
10. Functions
   a. Identify the graph of a function; determine whether a relation represents a function. (Sec 2.1: Examples 1,2,7)
   b. Find value of a function. (Sec 2.1: Example 4)
   c. Find the domain and range of a function from a graph. (Sec 2.1: Example 8)
   d. Find the domain of a function from the equation of the function. (Sec 2.1: Example 6)
   e. Obtain information from and about the graph of a function. (Sec 2.1: Examples 8,9)

### 2.3 Hwk 1-7 odd, 9, 11, 13, 15, 19, 25, 31, 33, 37, 39, 41-49 odd, 55, 63, 65, 71
11. Properties of Functions
   a. From a graph, identify intervals where a function is increasing, decreasing, or constant. (Sec 2.3: Example 3)
   b. From a graph, identify local maximums or local minimums and where they occur. (Sec 2.3: Figure 24)
   c. Find the average rate of change of a function. (Sec 2.3: Example 2)
   d. Find the slope of the secant line containing \((x, f(x))\) and \((x + h, f(x + h))\) on the graph of a function \(y = f(x)\). (Sec 2.3)
   e. Determine, from a graph or from an equation, whether a function is even or odd. (Sec 2.3: Example 5,6)
12. Recognize the graph, equation, and properties, of any of the basic functions in the Library of Functions (except Greatest-Integer). (Sec 2.3)
13. Functions defined piecewise
   a. Evaluate a function defined piecewise. (Sec 2.3: Example 7)
   b. Graph a function defined piecewise. (Sec 2.3: Example 7)

### 2.4 Hwk 1-23 odd, 29-43 odd, 59, 61, 63
14. Graphing with Reflections, Compressions/Stretching, Translations
   a. Identify reflections about the x- or y-axis; graph a function reflected about either axis. Understand the affect of a reflection about a coordinate axis on the coordinates of a point on a graph or on the domain or range of the function. (Sec 2.4: Figure 46)
   b. Identify compressing or stretching factors from an equation; graph a function with these. Understand the affect of a compressing or stretching factor on the coordinates of a point on a graph or on the domain or range of the function. (Sec 2.4: Example 3)
   c. Identify vertical or horizontal translations from an equation; graph a function with these. (Sec 2.4: Example 1,2)

### 2.5 Hwk 1-9 odd, 13-27 odd, 31, 33, 37, 47, 49, 51
15. Form the sum, difference, product, or quotient of two functions; evaluate; give the domain of the new function. (Sec 2.5: Example 1)
16. Function Composition
   a. Form the composite of two functions; evaluate a composite function. (Sec 2.5: Examples 2, 4)
   b. Find the domain of a composite function. (Sec 2.5: Example 3)

### 2.6 Hwk 1a, 3a
17. Construct and analyze functions and math models. (Sec 2.6: Examples 1-5)
3.1 Quadratic Functions

- Given a quadratic function in the form $y = ax^2 + bx + c$, find the vertex, all intercepts, and sketch the graph by hand. (Sec 3.1: Examples 1 – 5)
- Given a quadratic function in the form $y = a(x - h)^2 + k$, find the vertex, all intercepts, and sketch the graph by hand. (Apply graphing translations from Sec 2.4)
- Obtain the quadratic function needed to solve an applications problem; find the maximum or minimum value of a quadratic function. (Sec 3.1: Example 7-10)

3.2 Power Functions

- Graph a power function by hand; give domain and range and identify intervals where increasing or decreasing. (Sec 3.2: Figure 19, 20)

3.8 Polynomial and Rational Inequalities

- Solve a polynomial inequality algebraically. (Sec 3.8: Example 1, 2)
- Solve a rational inequality algebraically. (Sec 3.8: Example 3)
- Given a rational inequality, find the rational inequality needed to identify partitioning values. (Class Examples.)

4.1 Inverse Functions

- Determine whether a function is one-to-one by looking at a graph or set of ordered pairs. (Sec 4.1: Example 2)
- Given the graph of a one-to-one function, draw the graph of the inverse function. (Sec 4.1: Example 4)
- Use composition to determine if two functions are inverses. (Sec 4.1: Example 6)
- Given an equation of a function, find an equation of the inverse function, $f^{-1}$. (Sec 4.1: Example 6, 7)

4.2 Exponential Functions

- Given an exponential function, give the domain, range, intervals where increasing or decreasing, find intercepts when possible, sketch the graph by hand. (Sec 4.2: Example 2, 3)
- Given an exponential function with a translation, give the domain, range, intervals where increasing or decreasing, find intercepts when possible, sketch the graph by hand. (Sec 4.2: Example 4,5)
- Use a calculator to evaluate exponential expressions, including applications problems. (Sec 4.2: Example 1)
- Solve exponential equations by obtaining the same base. (Sec 4.5, Example 4)

4.3 Logarithmic Functions

- Evaluate logarithmic functions exactly. Identify when logarithmic functions are defined and when not defined. (Sec 4.3: Example 4)
- Given a logarithmic function, give the domain, range, intervals where increasing or decreasing, find intercepts when possible, sketch the graph by hand. (Sec 4.3: Figure 25)
- Given a logarithmic function with a translation, give the domain, range, intervals where increasing or decreasing, find intercepts when possible, sketch the graph by hand. (Sec 4.3: Example 6, 7)
- Find the domain of a logarithmic function. (Sec 4.3: Example 5)

4.4 Properties of Logarithms

- Understand when and how to apply basic logarithm properties. (Sec 4.4: Examples 1,2)
- Understand the inverse function relationship between exponential and logarithmic functions. Simplify expressions using this relationship. (Sec 4.4: Example 2)
- Write a logarithmic expression as a sum or difference of logarithms. (Sec 4.4: Example 3, 4, 5) Write a logarithmic expression as a single logarithm. (Sec 4.4: Example 6)
### 4.5 Hwk
1-11 odd, 15-23 odd, 31-39 odd, 45-53 odd

25. Solve Exponential Equations
   a. Solve exponential equations algebraically. (Sec 4.5: Example 7, 8, 9)
   b. Solve exponential equations algebraically when base is e or 10. (Class Examples)

26. Solve Logarithmic Equations
   a. Solve logarithmic equations algebraically. (Sec 4.5: Example 2)
   b. Solve logarithmic equations algebraically using the definition of logarithms. (Sec 4.5: Example 1, 3)

27. Solve other kinds of equations involving exponential functions. (Class Examples)

28. Solve other kinds of equations involving logarithmic functions. (Class Examples)

### 4.6 Hwk
1, 13, 29, 31, 33, 37

29. Compound Interest
   a. Future Value or Present Value with quarterly or monthly compounding. (Sec 4.6: Examples 1, 3, 4, 5)
   b. Future Value or Present Value with continuous compounding. (Sec 4.6: Examples 3, 4, 5)
   c. Determine time required to double or triple an amount of money. (Sec 4.6: Example 7)

### 10.1 Hwk
3, 11, 15, 17, 21, 25

30. Solve, algebraically, 2 linear equations in 2 unknowns; interpret the solution graphically. (Sec 10.1: Example 4-9)

### 10.7 Hwk
1, 5, 11

31. Solve, algebraically, a system of nonlinear equations in two unknowns. (Sec 10.7: Examples 1, 2)

### 10.8 Hwk
1, 3, 9, 11, 13, 21, 23

32. Linear Inequalities
   a. Graph a linear inequality. (Sec 10.8: Examples 1, 3)
   b. Graph a system of linear inequalities. (Sec 10.8: Examples 4, 6-9)