

MAC 1105 - COURSE OBJECTIVES

Updated for Fa'11

Your Homework problems are the on-line problems available at the russell eGrade site. (<http://russell.math.fsu.edu:9888/>)

There is no required text for MAC 1105. The sections listed are in the optional reference text (see Syllabus). The problems listed for those sections are optional.

The Objective numbers are our course objective numbers; they are not found in the text.

Obj

Sec A5; Optional problems: 1-11 odd

- Pre 1** Preliminary Objective P1: Understand the relationship between $a - b$ and $b - a$.
- Pre 2** Preliminary Objective P2: Complete trinomial factoring when given one factor; Factor quadratic trinomials
- 1.** Rational Expressions
- a.** Equivalent Rational Expressions. (Class Examples)
 - b.** Multiply or divide rational expressions; simplify. (Sec A5: Example 2)
 - c.** Add or subtract rational expressions; simplify. (Sec A5: Examples 3-6)
 - d.** Simplify mixed quotient – algebraic, rational, and irrational. (Sec A5: Example 7)

Sec A6; Optional problems: 37, 39, 41, 43, 47, 57, 61, 63, 65

- 2.** Understand the meaning of rational exponents; simplify numbers raised to rational exponents. (Sec A6: Example 7)
- 3.** Special Factoring Techniques
- a.** Factor by grouping. (refer to your class notes; may also refer to Sec A3: Example 3f)
 - b.** Factor and simplify an expression containing rational exponents. (Sec A6: Example 10)
 - c.** Factor and simplify an expression containing rational exponents and a common binomial factor. (Class Examples)

Class Notes; Optional problems: Sec 1.3 1-51 every other odd; Sec 1.5 1-15 and 31-53 every other odd

- 4.** Solving Equations
- a.** Solve linear equations. (Refer to your class notes; may also refer to Sec A1: Examples 12)
 - b.** Solve quadratic equations (by Factoring, Square Root Property, Quadratic Formula). (Refer to your class notes; may also refer to Sec 1.3: Algebraic solution of Example 6; Sec A2: Example 3)
 - c.** Solve rational equations. (Class Examples)
 - d.** Solve higher order equations. Understand the existence of real number roots. (refer to your class notes; may also refer to Sec A1: Example 13a)
 - e.** 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)
- 5.** Inequalities
- a.** Solve linear inequality and express the solution in interval notation. (Refer to your class notes; may also refer to Sec.1.5: Examples 7, 8)
 - b.** Use interval notation. (Refer to your class notes; may also refer to Sec.1.5: Example 1)
 - c.** Express the solution to inequalities in interval notation and understanding the terms “or” and “and”. (Refer to your class notes.)

Sec 1.1; Optional problems: 1, 21, 23, 31, 33, 49, 55, 57

6. Rectangular Coordinate System
- Understand plotting points on the Rectangular Coordinate System. (Sec 1.1: Figure 2, 3)
 - Recall and use the distance formula. (Sec 1.1: Example 2)
 - Recall and use the midpoint formula. (Sec 1.1: Example 5)

Sec 1.2; Optional problems: 3, 7, 9; For 11, 19, 25, 27: sketch the graph by hand by making a table of values, find any intercepts; 31, 33, 37, 41, 47, 49, 51, 53, 54, 57, 59, 61, 63; For 65, 67, 69, 71, 73: find the intercepts, test for symmetry, you do not need to graph.

7. General Graphing Principles
- 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)
 - Identify intercepts from a graph or from an equation. (Sec 1.2: Example 4,5)
 - Symmetry
Determine symmetry with respect to the x-axis, y-axis, or origin from a graph (Sec 1.2: Figure 27)
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)
Algebraically determine if the graph of an equation has any symmetry. (Sec 1.2: Example 8)

Sec 1.6; Optional problems: 1-75 odd, 85, 87, 89

8. Linear Equations
- Calculate and interpret slope. (Sec 1.6: Example 1)
 - Graph a linear equation. (Sec 1.6: Example 2, 3)
 - Identify the slope and y-intercept from the equation of a line. (Sec 1.6: Example 7)
 - Write the equation of a horizontal or vertical line (Sec 1.6: Example 3, 5).
 - Write the equation of a line given two points on the line or given a point on the line and the slope. (Sec 1.6: Example 4)
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)
 - Write the equation for a linear relationship described in an applications problem. (Class Examples)

Sec 1.7; Optional problems: 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)

Sec 2.1; Optional problems: 1, 3, 5, 9, For 13, 15, 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
- Identify the graph of a function; determine whether a relation represents a function. (Sec 2.1: Examples 1,2,7)
 - Find value of a function. (Sec 2.1: Example 4)
 - Find the domain and range of a function from a graph. (Sec 2.1: Example 8)
Find the domain of a function from the function rule. (Sec 2.1: Example 6)
 - Obtain information from and about the graph of a function. (Sec 2.1: Examples 8,9)

Sec 2.3; Optional problems: 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 – quadratic, rational, square root. (Sec 2.3: Example 2) (Square root functions will be evaluated only on quizzes, not tests.)
 - 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) (This topic will be evaluated only on quizzes, not tests.)
 - e. Determine, from a graph or from the function rule, whether a function is even or odd. (Sec 2.3: Example 5,6)
- 12. Recognize the graph, function rule, and properties, of any of the 7 basic functions:**
 $f(x) = x, f(x) = x^2, f(x) = \sqrt{x}, f(x) = x^3, f(x) = \sqrt[3]{x}, f(x) = |x|, f(x) = \frac{1}{x}$ (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)

Sec 2.4; Optional problems: 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)

Sec 2.5; Optional problems: 1-9 odd, 13-27 odd, 31, 33, 37, 47, 49, 51

- 15. Evaluate a sum, difference, product, or quotient of two functions. (Sec 2.5: Example 1)**
- 16. Form the composite of two functions; evaluate a composite function. (Sec 2.5: Examples 2, 4)**

Sec 2.6; Optional problems: 1a, 3a

- 17. Construct and analyze functions and math models. (Sec 2.6: Examples 1-5)**
- a. Formula
 - b. Revenue
 - c. Area
 - d. Distance
 - e. Optimal Time

Sec 3.1; Optional problems: 1-7 odd, 13-21 odd, 25, 29, 35, 37, 39, 41, 43, 43, 49, 53, 57, 59, 61, 63, 65, 67, 71, 73, 75 abc

- 18. Quadratic Functions**
- a. 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)
 - b. 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)
 - c. 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)

Sec 3.2; Optional problems: Figure 19 and 20	
19.	Graph a power function by hand; give domain and range and identify intervals where increasing or decreasing. (Sec 3.2: Figure 19, 20)
Sec 3.8; Optional problems: Solve algebraically. 1, 3, 9, 11 17, 25, 27, 33, 39, 41, 45, 47, 49, 53	
20.	Polynomial and Rational Inequalities
a.	Solve a polynomial inequality algebraically. (Sec 3.8: Example 1, 2)
b.	Solve a rational inequality algebraically. (Sec 3.8: Example 3)
c.	Given a rational inequality, find the rational inequality needed to identify partitioning values. (Class Examples.)
d.	Find the domain of a of an even-, or odd-root radical function with polynomial or rational radicand.
Sec 4.1; Optional problems: 1, 3, 5, 9, 11, 15, 17, 19; For 21, 25, 27: verify and graph.; For 29: just verify; 33, 35, 37, 39, 41; For 47, 49, 53: just find the inverse	
21.	Inverse Functions
a.	Determine whether a function is one-to-one by looking at a graph or set of ordered pairs. (Sec 4.1: Example 2)
b.	Given the graph of a one-to-one function, draw the graph of the inverse function. (Sec 4.1: Example 4)
c.	Given a function, find the inverse function, f^{-1} . (Sec 4.1: Example 6, 7)
Sec 4.2; Optional problems: For 11-18 omit D, H, G, do 11, 12, 15-17; For 19-24 omit F, do 19, 21-24; 25, 27, 37, 39, 41; and 4.5: 19,31	
22.	Exponential Functions
a.	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)
b.	Given an exponential function with a reflection or 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)
c.	Use a calculator to evaluate exponential expressions, including applications problems. (Sec 4.2: Example 1)
d.	Solve exponential equations by obtaining the same base. (Sec 4.5, Example 4)
Sec 4.3; Optional problems: 1-21 every other odd, 25-49 odd, For 53-60 omit D, G, H, do 53, 54, 57-59; For 61-66 omit E, F, do 61, 63, 65, 66; 67-73 odd,	
23.	Logarithmic Functions
a.	Evaluate logarithmic functions exactly. Identify when logarithmic functions are defined and when not defined. (Sec 4.3: Example 4)
b.	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)
c.	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)
d.	Find the domain of a logarithmic function. (Sec 4.3: Example 5)
Sec 4.4; Optional problems: 1-31 odd, 35,41	
24.	Properties of Logarithms
a.	Understand the definition of logarithmic notation, natural logarithms, and common logarithms. (Sec 4.3: Example 2,3)
b.	Understand when and how to apply basic logarithm properties. (Sec 4.4: Examples 1,2)
c.	Understand the inverse function relationship between exponential and logarithmic functions. Simplify expressions using this relationship. (Sec 4.4: Example 2)
d.	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)

Sec 4.5; Optional problems: 1-11 odd, 15-23 odd, 31-39 odd, 45-53 odd

- 25.** Solve Exponential Equations
- Solve exponential equations algebraically. (Sec 4.5: Example 7,8,9)
 - Solve exponential equations algebraically when base is e or 10. (Class Examples)
- 26.** Solve Logarithmic Equations
- Solve logarithmic equations algebraically when all terms involve logarithmic functions. (Sec 4.5: Example 2)
 - 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)

Sec 10.1; Optional problems: 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)

Sec 10.7; Optional problems: 1, 5, 11

- 31.** Solve, algebraically, a system of nonlinear equations in two unknowns. (Sec 10.7: Examples 1,2)
Know the graphs of the basic functions (from Obj 12 and listed below) as well as
 $f(x) = e^x, f(x) = \ln x$, and $(x - h)^2 + (y - k)^2 = r^2$

$$f(x) = x, f(x) = x^2, f(x) = \sqrt{x}, f(x) = x^3, f(x) = \sqrt[3]{x}, f(x) = |x|, f(x) = \frac{1}{x}$$