Course website: The syllabus for this course and assignments will be available through the course website which is located at

http://www.math.uky.edu/~ma113/f.13/

This handout only covers a few of the most important items from the syllabus. Please visit this website and read through the complete syllabus. Some instructors may use Blackboard or websites to provide section specific information. Information that applies to all sections will appear at the course website.

Textbook: The textbook for this course will be Calculus, Early Transcendentals, 2nd edition by J. Rogawski. The full text will likely be used for three semesters of Calculus at UK, MA 113, MA 114 and MA 213. A single-variable text is available that includes the material for MA 113 and MA 114. Both texts are available with optional access to an online version of the book. You may purchase either the paperback edition that is custom-published for UK or the standard edition.

Grading: Your grade in MA 113 will be based on four exams, web homework, six written assignments and attendance in lecture. Your grade in MA 193 will be based on attendance in recitation and your grade in MA 113.

Exam dates: There will be four exams for this course given at the following dates and times. Please make every effort to attend each exam.

- Exam 1 5-7 pm, Tuesday, 24 September 2013
- Exam 2 5-7 pm, Tuesday, 22 October 2013
- Exam 3 5-7 pm, Tuesday, 19 November 2013
- Exam 4 8:30-10:30 pm, Wednesday, 18 December 2013

Web Homework: This course will use web homework available at

https://courses1.webwork.maa.org/webwork2/uky-ma113/

Your username to log in will be your link blue id with all letters upper case, for example CRONA222, and your password will be your eight digit student id number. For most students, this number begins with a 1, for example 12345678. Do not include the initial 9. Students who add after the start of the semester will not have their accounts created immediately.

Recitation worksheets: In each recitation you will work on a worksheet of problems with fellow students. The first three worksheets are attached to this document. The full packet is available at the course website and beginning with the fourth recitation, students are expected to bring the day’s worksheet to recitation.

Academic honesty: Students are encouraged to work together on web homework and written assignments to understand a problem and to develop a solution. However, the final product must be your own work. Copying during examinations is not allowed. Cheating or plagiarism is a serious offense, and it will not be tolerated. For more details on the University policy on academic dishonesty, please visit

http://www.uky.edu/Ombud/ForStudents_AcademicIntegrity.php.

August 20, 2013
Worksheet # 1: Review

1. Find the equation of the line that passes through (1, 2) and is parallel to the line $4x + 2y = 11$. Put your answer in slope intercept form.

2. Find the slope, $x$-intercept, and $y$-intercept of the line $3x - 2y = 4$.

3. Write the equation of the line through $(2, 1)$ and $(-1, 3)$ in point slope form.

4. Write the equation of the line containing $(0, 1)$ and perpendicular to the line through $(0, 1)$ and $(2, 6)$.

5. The quadratic polynomial $f(x) = x^2 + bx + c$ has roots at $-3$ and $1$. What are the values of $b$ and $c$?

6. Let $f(x) = Ax^2 + Bx + C$. If $f(1) = 3$, $f(-1) = 7$, and $f(0) = 4$ what are the values of $A, B$ and $C$?

7. Find the intersection of the lines $y = 5x + 10$ and $y = -8x - 3$. Remember that an intersection is a point in the plane, hence an ordered pair.

8. Recall the definition of the absolute value function:

   $$|x| = \begin{cases} 
   x & \text{if } x \geq 0 \\
   -x & \text{if } x < 0 
   \end{cases}.$$

   Sketch the graph of this function. Also, sketch the graphs of the functions $|x + 4|$ and $|x| + 4$.

9. A ball is thrown in the air from ground level. The height of the ball in meters at time $t$ seconds is given by the function $h(t) = -4.9t^2 + 30t$. At what time does the ball hit the ground (be sure to use the proper units)?

10. We form a box by removing squares of side length $x$ centimeters from the four corners of a rectangle of width 100 cm and length 150 cm and then folding up the flaps between the squares that were removed. a) Write a function which gives the volume of the box as a function of $x$. b) Give the domain for this function.

11. True or False:

   (a) For any function $f$, $f(s + t) = f(s) + f(t)$.
   (b) If $f(s) = f(t)$, then $s = t$.
   (c) If $s = t$, then $f(s) = f(t)$.
   (d) A circle can be the graph of a function.
   (e) A function is a rule which assigns exactly one output $f(x)$ to every input $x$.
   (f) If $f(x)$ is increasing then $f(-52.55) \leq f(1752.0001)$.
1. Convert the angle \( \pi/12 \) to degrees and the angle 900° to radians. Give exact answers.

2. Suppose that \( \sin(\theta) = 5/13 \) and \( \cos(\theta) = -12/13 \). Find the values of \( \tan(\theta) \), \( \cot(\theta) \), \( \csc(\theta) \), \( \sec(\theta) \), and \( \csc(\theta) \).

   Find the value of \( \tan(2\theta) \).

3. If \( \pi/2 \leq \theta \leq 3\pi/2 \) and \( \tan(\theta) = 4/3 \), find \( \sin(\theta) \), \( \cos(\theta) \), \( \cot(\theta) \), \( \sec(\theta) \), and \( \csc(\theta) \).

4. Find all solutions of the equations a) \( \sin(x) = -\sqrt{3}/2 \), b) \( \tan(x) = 1 \).

5. A ladder that is 6 meters long leans against a wall so that the bottom of the ladder is 2 meters from the base of the wall. Make a sketch illustrating the given information and answer the following questions.

   How high on the wall is the top of the ladder located? What angle does the top of the ladder form with the wall?

6. Let \( O \) be the center of a circle whose circumference is 48 centimeters. Let \( P \) and \( Q \) be two points on the circle that are endpoints of an arc that is 6 centimeters long. Find the angle between the segments \( OQ \) and \( OP \). Express your answer in radians.

   Find the distance between \( P \) and \( Q \).

7. The center of a clock is located at the origin so that 12 lies on the positive \( y \)-axis and the 3 lies on the positive \( x \)-axis. The minute hand is 10 units long and the hour hand is 7 units. Find the coordinates of the tips of the minute hand and hour hand at 9:50 am on Newton’s birthday.

8. Find all solutions to the following equations in the interval \( [0, 2\pi] \). You will need to use some trigonometric identities.

   \[
   \begin{align*}
   (a) \quad & \sqrt{3}\cos(x) + 2\tan(x)\cos^2(x) = 0 \\
   (b) \quad & 3\cot^2(x) = 1 \\
   (c) \quad & 2\cos(x) + \sin(2x) = 0
   \end{align*}
   \]

9. A function is said to be periodic with period \( T \) if \( f(x) = f(x+T) \) for any \( x \). Find the smallest, positive period of the following trigonometric functions. Assume that \( \omega \) is positive.

   \[
   \begin{align*}
   (a) \quad & |\sin(t)| \\
   (b) \quad & \sin(3t). \\
   (c) \quad & \sin (\omega t) + \cos (\omega t). \\
   (d) \quad & \tan^2(\omega t).
   \end{align*}
   \]

10. Find a quadratic function \( p(x) \) so that the graph \( p \) has \( x \)-intercepts at \( x = 2 \) and \( x = 5 \) and the \( y \)-intercept is \( y = -2 \).
Worksheet # 3: Inverse Functions, Inverse Trigonometric Functions, and the Exponential and Logarithm

1. Let \( f(x) = 2 + \frac{1}{x+3} \). Determine the inverse function of \( f \), \( f^{-1} \). Give the domain and range of \( f \) and the inverse function \( f^{-1} \).

2. Solve \( 10^{2x+1} = 100 \).

3. Suppose \( a \) and \( b \) are positive real numbers and \( \ln(ab) = 3 \) and \( \ln(ab^2) = 5 \). Find \( \ln(a) \), \( \ln(b) \), and \( \ln(a^3/\sqrt{b}) \).

4. Consider the function \( f(x) = 1 + \ln(x) \). Determine the inverse function of \( f \). Give the domain and range of \( f \) and of the inverse function \( f^{-1} \).

5. Consider the function whose graph appears below.

   \[ y = f(x) \]

   (a) Find \( f(3) \), \( f^{-1}(2) \) and \( f^{-1}(f(2)) \).

   (b) Give the domain and range of \( f \) and of \( f^{-1} \).

   (c) Sketch the graph of \( f^{-1} \).

6. Find the exact values of the following expressions. Do not use a calculator.

   (a) \( \tan^{-1}(1) \)

   (b) \( \tan(\tan^{-1}(10)) \)

   (c) \( \sin^{-1}(\sin(7\pi/3)) \)

   (d) \( \tan(\tan^{-1}(0.8)) \)

7. Give a simple expression for \( \sin(\cos^{-1}(x)) \).

8. Let \( f \) be the function with domain \([\pi/2, 3\pi/2]\) with \( f(x) = \sin(x) \) for \( x \) in \([\pi/2, 3\pi/2]\). Since \( f \) is one to one, we may let \( g \) be the inverse function of \( f \). Give the domain and range of \( g \). Find \( g^{-1}(1/2) \).

9. True or False:

   (a) Every function has an inverse.

   (b) If \( f \circ g(x) = x \) for all \( x \) in the domain of \( g \), then \( f \) is the inverse of \( g \).

   (c) If \( f \circ g(x) = x \) for all \( x \) in the domain of \( g \) and \( g \circ f(x) = x \) for all \( x \) in the domain of \( f \), then \( f \) is the inverse of \( g \).

   (d) If \( f(x) = 1/(x+2)^3 \) and \( g \) is the inverse function of \( f \), then \( g(x) = (x + 2)^3 \).

   (e) The function \( f(x) = \sin(x) \) is one to one.

   (f) The function \( f(x) = 1/(x + 2)^3 \) is one to one.

10. Let \( f \) be a linear function with slope \( m \) with \( m \neq 0 \). What is the slope of the inverse function \( f^{-1} \).