MTH 1420, SPRING 2012
DR. GRAHAM-SQUIRE

LAB 2 : AREA, INTEGRALS, AND DERIVATIVES

Names: ____

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1. Introduction

In this lab we will look at constructing a function that finds the area under a curve between two points. We will then look at its properties and how they relate to differentiation. This will lead us to a better understanding of the Fundamental Theorem of Calculus, which we will discuss this week in class. Make sure to *show all of your work* wherever it is appropriate.

2. Instructions

(1) Introduce yourself to your lab partner(s).
(2) Work on the problems for the entire lab time. If you are confused about something, talk to your lab partner and explain your question to them to see if they can help. If everyone in the group is stumped, come talk to me for a hint.
(3) Your group should write up and turn in one completed lab at the start of the next lab period. You can use this sheet as a cover sheet for the lab you turn in. Each member of the group should write up at least part of the lab, but you should check each other's work since everyone in the group gets the same score.

3. Discovery Project

The lab can be found in the textbook on page 366, listed as the Discovery Project: Area Functions. You should answer all the questions. Notice that number 3 requires you to use a graphing calculator or computer program such as Sage or Maple. If you want to use Sage, here are some of the commands you could use:

- First, you can name a function by just writing `f(x)= x^2+2*x+7`
  This allows you to just refer to the function f later on instead of typing it in each time.

- To plot a graph, you type in

  ```
  plot(f, (x, 0,5))
  ```

  where f is your function, x is the variable in the function, and the 0,5 gives the upper and lower bounds for the x-values you want to graph.
- To do a definite integral $\int_0^1 f(x)dx$, you can use either

  ```
  integral(f, x,0,1)
  ```

  or

  ```
  numerical_integral(f, 0, 1)
  ```

  The difference is this- sometimes the integral command does not give you a satisfactory answer (it searches for antiderivatives for your function and then plugs in your limits of integration) if the function does not have a nice antiderivative. In that situation, the numerical option is better.

  You can also do indefinite integrals by doing `integral(f,x)` . Not needed for this project, but could help you to check your work.
- You don't really need it, but for completeness I should add that if you want to take a derivative, you use `derivative(f,x)` .