INDIVIDUAL ASSIGNMENT 3

MAT 305 FALL 2009

Due date: 5 Dec 2011

In this assignment, you will scour your knowledge of mathematics to come up with an idea for an interactive Sage worksheet (using the interface elements of the `@interact` decorator, as described in the lecture on interactive worksheets) that illustrates the principle of the the concept.

Phase 1: Conception. Due Mon, 21 Nov. Come up with an idea that illustrates a connection between a topic you have studied and a geometric representation. For example, I have illustrated in class the relationship between secant lines and a tangent line, as well as the Riemann approximation of a definite integral. Most mathematical topics can be illustrated quite effectively with some geometry. All you need is a topic, and a *clear* description of how you want the user to interact with the worksheet. It need not be complicated; indeed, "simpler" is usually better — but it should not be trivial, either.

Email your idea to me, to "register" it for yourself, and to get my approval. My approval is contingent partly on whether I think it might be more difficult than you realize, and whether I think the idea is suitable.

Phase 2: Design. Due Mon, 28 Nov. Clarify your idea, and outline an algorithm for the interactive portion. You need to design at least one algorithm for the main routine; you can (and perhaps should) divide and conquer: break the idea into parts, and design algorithms for each part. It is acceptable to meet with me to get help on this part; in fact, I expect most of you will need some assistance in the design.

Phase 3: Implementation. Due Mon, 5 Dec. Implement your algorithm in a Sage worksheet. The code should be documented in such a way that it is clear *who* wrote it, *when*, *what* it is supposed to do, and *how* the user should use it. This documentation can be both text on the worksheet (HTML) and comments in the Python code. (You should probably use both.)

Breakdown of the grade.

10% Workable idea, *in time.* -1% for each day late.
30% Pseudocode. -2% for each day late.
50% Working implementation. -5% for each day late.
10% Good documentation.

How will I get ideas?!? You can look for ideas in the following places:

- At

  `www.math.usm.edu/sage/calc1.html`

  you will find some interactive worksheets I designed for Calculus some years ago. They are listed under the heading, "SAGElets". Some are rather good as a stand-alone toy; a few are general tools, and as such may not make much sense; others, perhaps, should never have seen the light of day. (It was an experiment. I sometimes use them when teaching.)

You can download the worksheets to a computer, then upload them to your Sage account, experiment with them, get ideas, etc.

- At

  `wiki.sagemath.org/interact/`

  you will find interactive worksheets written by people all over the world, *with source code*. You can't copy these programs, but if you want to modify one, or do a different take on a topic, I will entertain the idea. (If nothing else, some of them might enlighten you — there are some really nice ideas there.)
- Think about some topic in a math class that involves a connection with geometry. It's okay to look in your textbooks and get ideas from pictures.
- If you're really desperate and time grows short, ask me. I have ideas. Maybe they're lame (see the SAGElets) but they're still *ideas*.