Introduction to Computer Science
Homework Four
Due Sunday January 30, 2011

General Instructions

- Email me the program as a .py attachment.
- Name your programs with a helpful name. Include your name somewhere in the file name.
- Your program should be fully commented. Be sure to include your name and the date and an overall description of what the program does, in addition to any other comments that are needed.
- My plan is to post the random graphics program on the website, since I thought it might fun to look at each other's creations. If you don't want your program posted, just let me know.

1. This is a more complex assignment than the ones we've done thus far. Give yourself some time to implement it, plan out the structure of the program, and be sure to use ample comments so it is clear to read.

   Your task is to write a program the uses Zelle's graphics package and some random number features to make an interesting or aesthetically appealing picture using random shapes and colors. You can use circles or triangles or something else or a combination. I would recommend setting colors randomly as in the example program I used in class. If you restrict the colors so as to not go from 0 to 255 you can produce some interesting effects.

   Your program needs to incorporate the following

   - Should use two GraphWin windows. One window will contain the picture that gets created. The other window should contain some information about the program and some boxes into which the user can enter some choices, perhaps the total number of shapes or the size range of the shapes or something.
   - Use the setCoords option for the main graphics window so that the program works for different sizes of the window.
   - Use the getMouse() method at least once. Most likely you will want to have the user click when he or she is done entering information and is ready to start drawing.
   - Use the randrange function at least once to randomize some aspect of the pictures. (You'll probably want to use it multiple times.)

   After the assignment I've included some tips and advice for writing this program.

2. Write a program that produces the average of a bunch of numbers. The program should print a welcome message and then ask the user how many numbers he or she wants to average. The user should then enter the numbers. Then the program should then output the average and print a farewell message. (**Optional:** Also have the program calculate and output the standard deviation of the numbers.)

3. **Optional:** The getMouse() method returns the point on the window where the mouse was clicked. This information can then be used in the program. To try this out, write a program that makes a window, has a user click on two points, and then draws a rectangle. See section 4.7.2 of Zelle for details. Alternatively, you could have the user draw a circle by specifying the radius and then a point on the circle. (This one is a little more challenging.)

Some Advice for the Random Graphics Program

1. I would write the GUI—i.e. the window where the user enters options—last. First set the options by hand in the code, or using simple text prompts. Don't code up the GUI until you're sure of the options you want to include in the it, since it can be a pain to add an option or some text once you've already gotten the spacing and such to work.

2. Depending on how you set thing up you may want to get a random number between 0 and 1, instead of an integer in a range, which is what randrange gives you. To get a random floating point number between 0 and 1, use the random() function:

```
from random import random
x = random()
```

   x is now a random number between 0 and 1.

3. You may also want the computer to pause between drawing random circles. (I did this for my program, since I didn't like it when python drew the circles really quickly.) Here's how you can get the program to pause:

```
from time import sleep
sleep(1)
```

   The function sleep(1) will make the program go to sleep—i.e. do nothing—for 1 second. In general, sleep(n) will make the program sleep for n seconds.