COMP 115   Robots, Games, and Problem Solving

Lab #9

In this lab, you will practice writing functions.

The endgame of the lab is relatively simple: you will write a program that asks the user to choose one of 3 options on a menu, and execute the task corresponding to the option requested. I have broken this task into multiple functions. Make sure that you read the instructions carefully, your functions should do *exactly* what is described.

1. Write a function `printmenu` that prints the following on screen:
   ```
   Please choose one of the following options:
   1 Calculate the area of a circle
   2 Calculate the area of a rectangle
   3 Calculate the area of a triangle
   4 Exit the program
   ```

2. Write a function `askmenu` that prints the menu (using the previous function), asks the user to enter one of the options, verifies that the option is valid, and if so, *returns* the option entered by the user *in the form of a string*. If the option entered by the user is not valid, the function should keep printing the menu and ask again the user to enter one of the option, and keep doing so until the user enters a valid option.

_____   Show me the result when you are done.

The following functions should not ask anything to the user, they just get the values they need for their computations from input parameters.

3. Write a function `circlearea` that takes one parameter, a floating point number `radius` and *returns* the area of a circle of that radius (the formula for the area is $a = \pi \cdot r^2$).

4. Write a function `rectanglearea` that takes two parameters, two floating point numbers `height` and `width`, and *returns* the area of a rectangle with this width and height.

5. Write a function `trianglearea` that takes three parameters, three floating point numbers `side1`, `side2` and `side3` and *returns* the area of a triangle with these sides using the following formulas:

$$t = \frac{side1 + side2 + side3}{2} \qquad area = \sqrt{t(t - side1)(t - side2)(t - side3)}$$

The calculations described in the menu will all require the program to ask the user for a number of floating-point numbers. We would like to prevent the program to end with an error, so we will need to do something like the test you programmed a couple assignments ago that determined whether a user input was a valid float. I posted my own version of that code in the file `floatReader.py` on the course schedule.

6. Write a function `isFloat` that takes one parameter, `teststring`, and runs a similar test to what is done in the file `floatReader.py`, but instead of printing whether or not the input was valid, the function should *return* `True` if the parameter was a valid float, and *return* `False` if the parameter was not valid.
   The function should not ask anything to the user. It should only work on the string it receives as an input parameter.

7. Write a function `getFloat` that takes one parameter, a string `prompt`. The value of `prompt` should be passed on to the `input` function to be printed on screen. This should ask the user to enter a floating-point number. The function should then test the string entered by the user to make sure that it is a valid floating point number using the function `isFloat`. If it is valid, the function should return a floating-point number corresponding to this string. If not, the function should print on screen that the input was invalid, and keep asking the user to enter a value with `prompt` until the user enters a valid number.

_____   Show me the result when you are done.

Finally, we do a function `main` that makes everything work together. The main function should:

8. print the menu and get the user to enter an option using the `askmenu` function,

9. and as long as the user does not enter option 4, do the following:

   (a) ask the user to enter a number of floating point values appropriate to the option entered by the user
   (b) calculate the area of the figure using the appropriate function
   (c) print the result on screen
   (d) print the menu again and get the user to enter an option using the `askmenu` function.

_____   Show me the result when you are done.

If you finish early, feel free to try to add another option to the menu "Calculate the area of a regular pentagon". To do this, you will need to modify the `printmenu` and `askmenu` functions accordingly, write a `pentagonarea` function and modify the `main` function to use it. The formula to calculate the area of a regular pentagon given the length of its sides is:

$$area = \frac{5(side)^2}{4\tan(\pi/5)}$$

_____   Show me the result when you are done.

When you are done, write your name on the sheet and hand it to the lab instructor.

Name: _____