Intro. to Computing (810:051) **Lab 4** **Name:_____**

Objectives:

- Understand the function definitions and calling
- Understand the run-time stack and parameter-passing in Python

To start the lab: Download the file lab4.zip from http://www.cs.uni.edu/~fienup/cs051s10/labs/index.htm and extract it to the Desktop.

Part A: Function - flow of control, and Scope vs. Local Variables: For the following programs, predict the output **before** executing them.
The following programs are in lab4\cubePlus.py and lab4\cubePlus2.py.

```
value = 100   # a global variable

# Function to calculate the cube of a number
def cubePlus(num):
    num_squared = num * num
    return num_squared * num + value

# call the function
value = 2
print 'The value',value,'raised to the power 3 + ', value, 'is', cubePlus(value)
```

Predicted Output	
Actual Output	

Explain the actual output:

```
value = 100   # a global variable

# Function to calculate the cube of a number
def cubePlus2(num):
    global value
    result = num * num * num + value
    value = 5000
    return result

# call the function
value = 2
print 'The value', value, 'raised to the power 3 + ',
print value, 'is', cubePlus2(value), '.  Value is', value
```

Predicted Output	
Actual Output	

Explain the actual output:

In cubePlus2 comment out the "global value" statement and rerun the program. What error message do you get?

Explain the error message:

After you have answered the above questions, raise your hand and explain your answers.

Part B: Write a function that calculates the cost per square inch of a circular pizza. (Recall the formula for the area of a circle: area = πr^2, where π is about 3.14 and r is the radius of the circle) Write a program using the function to determine the cost per square inch of each size of pizza, and record them in the following table:

Pizza Size	Small	Medium	Large	Family
Diameter	8"	12"	16"	20"
Cost	$6.50	$9.25	$11.50	$15.00
Cost per square inch				

After you have your program working correctly ("debugged your program"), raise your hand and demonstrate your program.

Part C: Write a simple program

Write a program that takes the radius of a sphere as input and outputs the sphere's diameter, circumference, surface, and volume. The formulas for these are:

$circumference = 2\pi \times radius$ $\quad surface = 4\pi \times radius^2$ $\quad volume = \frac{4}{3}\pi \times radius^3$

Your program should use function definitions main, sphereCircumference, sphereSurface, and sphereVolume. The main function should be called at the bottom of the file with the function definitions being at the top of the file (see below).

```
"""
File:  sphere.py ...
"""
def main():
      ...

def sphereCircumference(...

def sphereSurface(...

def sphereVolume(...

# call to main
main()
```

After you have your program working correctly ("debugged your program"), raise your hand and demonstrate your program.

If you complete all parts of the lab, nothing needs to be turned in for this lab. If you do not get done today, then show me the completed lab in next week's lab period.
Make sure that you log off the computer before you leave.