CPS 600, Fall 2018

Assignment 2:

Due: Friday, October 5, EOD

You will upload to blackboard a single `.py` file with your solutions to the problems below. You are encouraged to fill out the `template.py` file available in the BB item containing this assignment description, leaving the filename *unchanged*.

Problem 0 Run the following Python code to price a European call option. Try to understand the code below. What is the result of the execution of this code?

To price a call, we have five input variables: S is thecurrent stock price, X is the exercise price (a fixed price), T is the maturity (in years), r is the continuously compounded risk-free rate, and sigma is the volatility of the underlying security (such as a stock).

```
from math import *
def bs_call(S,X,T,r,sigma):
    d1 = (log(S/X)+(r+sigma*sigma/2.)*T)/(sigma*sqrt(T))
    d2 = d1-sigma*sqrt(T)
    return S*CND(d1)-X*exp(-r*T)*CND(d2)

def CND(X):
    # cumulative standard normal distribution
    (a1,a2,a3,a4,a5)=(0.31938153,-0.356563782,1.781477937,-1.821255978,1.330274429)
    L = abs(X)
    K=1.0/(1.0+0.2316419*L)
    w=1.0-1.0/sqrt(2*pi)*exp(-L*L/2.)*(a1*K+a2*K*K+a3*pow(K,3)+a4*pow(K,4)+a5*pow(K,5))
    if X<0:
        w = 1.0-w
    return w

print(bs_call(40,42,0.5,0.1,0.2))
```

Problem 1 Seeing the World: Think of at least five places in the world you'd like to visit. Store the locations in a list. Make sure the list is not in alphabetical order. Use **sorted** to print your list in alphabetical order without modifying the actual list. Show that your list is still in its original order by printing it. Use **sorted** to print your list in reverse alphabetical order without changing the order of the original list. Show that your list is still in its original order by printing it again. Use reverse to change the order of your list. Print the list to show that its order has changed. Use reverse to change the order of your list again. Print the list to show it is back to its original order. Use sort to change your list so it is stored in alphabetical order. Print the list to show that its order has been changed. Use sort to change your list so that it is stored in reverse alphabetical order. Print the list to show that its order has changed.

Problem 2 Write a function called favorite_book that accepts one parameter, title. The function should print a message, such as "One of my favorite books is Alice in Wonderland". Call the function, making sure to include a book title as an argument in the function call.

Problem 3 Write a function called "ball" that accepts one argument - "radius". The function should calculate the area $4\pi r^2$ and volume $\frac{4}{3}\pi r^3$. The function should return a tuple (area, volume). Write

a second function called “circle" that calculates the area πr^2 and circumference $2\pi r$ of the circle. The function returns the tuple (area, circumference). The main function should take the value of the radius from the keyboard, call the functions and print 2 sentences, for example : “The ball has the radius XX.XX; its area is equal to XXX.XX and its volume is XXXX.XX". “The Circle has the radius XX.XX; its circumference is XXX.XX and its area is XXXX.XX" In order to use the correct value of pi, import the math library and use math.pi in your calculations. Include a comment at the beginninng of your program, at the beginniong of each function, and at the beginning of the main section of the program.

RMK: I will explain what this last part means. We are going to review how to write a script in Python.