EECS 360 Signal and System Analysis

Lab 2. Matlab Functions

Goal:

The goal of this lab is to familiarize students with the basics of writing functions and using the functions in MATLAB. MATLAB can be used for solving and analyzing various mathematical problems. In this lab session, students will learn to implement custom designed functions and use them for plotting various figures.

Instructions:

For this lab assignment, you will need to write three script files. One titled *Calculate_AP.m* (case sensitive), second titled *Calculate_volume.m* and third titled *lab2plot.m*. In first two script files, you will need to implement functions to calculate perimeter, area, and volume of geometrical shapes as specified. The third *lab2plot.m* file is used to practice the graphing features in Matlab including subplot, title.

Useful Link:

Using the following links to find out how to calculate the perimeter, area, and the volume of a particular shape:

Perimeter:
http://mathworld.wolfram.com/Perimeter.html

Area:
http://www.efunda.com/math/areas/RegularPolygonGen.cfm

Volume:
http://mathworld.wolfram.com/Volume.html

1. Write a single function named "*Calculate_AP*" that does the following:

    a) The function should accept a type of shape and a row matrix of side/radius lengths as arguments. The row matrix can be of arbitrary size.

    b) The function should return two matrices: one with calculated perimeters, and the other with calculated areas corresponding to the side/radius matrix and type of shape.

    c) The function should work for all positive, nonzero side/radius lengths and for the following shapes:

        (1) circle,

        (2) triangle,

        (3) pentagon,

        (4) hexagon,

    d) For simplicity, you may assume all the polygons are regular polygons.

2. Use the "*Calculate_AP*" function created in problem 1 to calculate perimeter and area for the polygons with following parameters:
        (1). circle: side = N/A ,radius = any
        (2). triangle: side = [3,4,5], radius = N/A
        (3). regular pentagon: side = 6
        (4). regular hexagon: side = 6

3. Create a function named "*Calculate_Volume*" that does the following:

    c) The function should accept as arguments a type of shape and a row matrix of side/radius lengths.

    d) The function should return a row matrix of calculated volumes corresponding to the side/radius row matrix and type of shape.

    e) The function should work for all positive, nonzero side/radius lengths and for the following shapes:

        (1) sphere

        (2) cylinder

        (3) right cone

        (4) cube.

4. Using the *Calculate_Volume* function to calculate the 3-D shapes specified in 3(e) with the following parameters:

      sphere radius = 3.5

      cylinder radius = 2.5; height = 10

      right cone: base circle radius = 4; height = 6

      cube: side length = 4

5. Download the .m file named *lab2plot.m* from the blackboard and modify it so that the following purposes can be achieved:

      (1). Plot four different figures on one graph

      (2). Add title to each to describe the content of the figure.

      (3). Save the figure as .jpg or .bmp format and insert it in your lab report.

6. Lab report requirements:

The lab report should follow the lab report format attached in the lab syllabus. You also need to attach the graph and Matlab codes (*Calculate_AP, Calculate_Volume* and *lab2plot.m*) in the end of your lab report.