CHS – Spring 2022
Computers for Engineers
(GENN004)

Faculty of Engineering

Cairo University

Lab07 – Function

1. Write a function that will receive as an input argument a length in meter, and will return the length in both foot and inch. The conversion factors are (1 foot = 0.3048 m and 1 inch = 0.0254 m). Write a script to use the developed function

   I/O Example
   Enter length in meter: 15
   15 meter = 4.572 feet
   15 meter = 0.381 inch

2. A vector can be represented by its rectangular coordinates x , y and z or by its spherical coordinates r, theta and phi. Where r=sqrt(x^2+y^2+z^2), theta=atan(y/x) and phi=atan(sqrt(x^2+y^2)/z). Write a function recSph to receive as input arguments the rectangular coordinates and return the corresponding spherical coordinates. Write a script to use the developed function.

   I/O Example
   Enter X: 10
   Enter Y: 20
   Enter Z: 30
   r = 37.417
   Theta = 63.435 degree
   Phi = 29.055 degree

3. Write a script that will:
   a. Call a function to prompt the user for an angle in degrees.
   b. Call a function to calculate and return the angle in radians.
   c. Call a function to print the result.

   Write all of the functions as well. Note that the solution to this problem involves four M-files: one which acts as a main program (the script shown below), and three for the functions.

   d=getInput(); % getInput is a function that prompt the user for an angle in degrees.
   r=convertDeg(d); % deg2rad is function to calculate and return the angle in radians.
   showValue(r); % showValue is a function to print r.

   I/O Example

   Enter Angle in degree: -50
   Enter positive number
   Enter Angle in degree: -100
   Enter positive number

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Enter Angle in degree: 150
Angle = 150 degree = 2.62 radian

4. Write a program that takes a list of students' scores in an exam (stored in an array) and computes their grades. (A >=90%, 90>B>=80, 80>C>=70, 70>D>=60, 60>F) and store them in an array. The program should make use of a function scoresToGrades which takes in array of scores and returns the corresponding grades.

    I/O Example

    A = [74 82 41 55 68 98]
    G = [C B F F D A]

5. Write a program to print a temperature conversion chart. It will print temperature in Celsius, from 1 to an integer specified by the user, in one column and the corresponding temperature in Fahrenheit (C = (F − 32) * 5/9) in a second column. The main script will call one function that prompts the user for the maximum temperature in Celsius (**MAX_Cel_Temp**); this function must error-check to make sure that the user enters a valid positive integer. The script then calls a function to write the temperatures to the screen (**Print_Chart**). Enter Max. Cel. Temp.: -10

    I/O Example

    Enter posstive number
    Enter Max. Cel. Temp.: -20
    Enter posstive number
    Enter Max. Cel. Temp.: 10
    Cel.   Fah
    1   33.800
    2   35.600
    3   37.400
    4   39.200
    5   41.000
    6   42.800
    7   44.600
    8   46.400
    9   48.200
    10   50.000

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6. Write a program that reads the departure time and the arrival time of n trains and calculate the trip time of each train (assume no trip spans over two days). Use function **Cal_trip_Time** to calculate the trip time.

I/O Example

Enter number of train trips: 2
Trip 1:
Depart Time HH: 5
Depart Time MM: 20
Arrival Time HH: 9
Arrival Time MM: 30

Trip Time- 4:10

Trip 2:
Depart Time HH: 8
Depart Time MM: 10
Arrival Time HH: 10
Arrival Time MM: 5

Trip Time- 1:55