CE 300 SUMMER PRACTICE

DATA ANALYSIS ASSIGNMENT

Q1)

The hourly traffic counts (the rows) at three intersections (columns) are given below.

Write a script “trafficcount.m” to draw the histogram plot of the data and calculate the followings;

a) Mean of intersection 1
b) Standard deviation of Intersection 2
c) Maximum and minimum traffic counts of Intersection 3

	Int1	**Int2**	**Int3**
Hour-1	10	18	22
Hour-2	20	22	30
Hour-3	15	14	18
Hour-4	18	12	18
Hour-5	17	10	22
Hour-6	11	10	22
Hour-7	10	5	18
Hour-8	5	4	18

Q2)

Write the following data about the biggest three cities of Turkey. The data contains

1) Name of the city
2) Area of the city
3) Population of the city
4) Number of districts of the city.

Write the as shown below;

Ankara	25401,94	4771716	25
İstanbul	5315,33	13255685	40
İzmir	12015,61	3948848	30

Hint: Use fopen and fprintf commands.

Q3)

Obtain the ground acceleration component of Kocaeli earthquake measured in Duzce. Then, determine the ground velocities and the ground displacements from the accelogram "duzce.txt" given at www.ce.metu.edu.tr/~ce300. Finally, plot the ground acceleration (ag), the ground velocity (vg) and the ground displacement (ug) versus time.

Utilize the trapezoidal rule to solve the integrals. For that purpose write a function called 'trapezoid.m' which computes the approximate integral of f(x) using the trapezoidal rule.

Hint:

1. The displacement, velocity and acceleration are related to each other by the below formulas.

$$a = \frac{dv}{dt} \Rightarrow a * dt = dv$$

$$\int_{a_1}^{a_2} a * dt = \int_{v_1}^{v_2} dv$$

$$\Delta v = v_2 - v_1 = \int_{a_1}^{a_2} a * dt \qquad \textit{Equation 1}$$

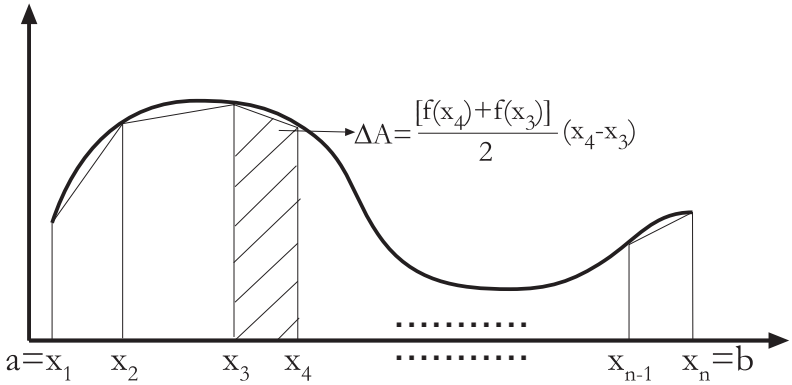
$$v = \frac{du}{dt} \Rightarrow v * dt = du$$

$$\int_{v_1}^{v_2} v * dt = \int_{u_1}^{u_2} du$$

$$\Delta u = u_2 - u_1 = \int_{v_1}^{v_2} v * dt \qquad \textit{Equation 2}$$

2. The ground is at rest when the earthquake hits, i.e. u(t=0)=0 m and v(t=0)=0 m/s.

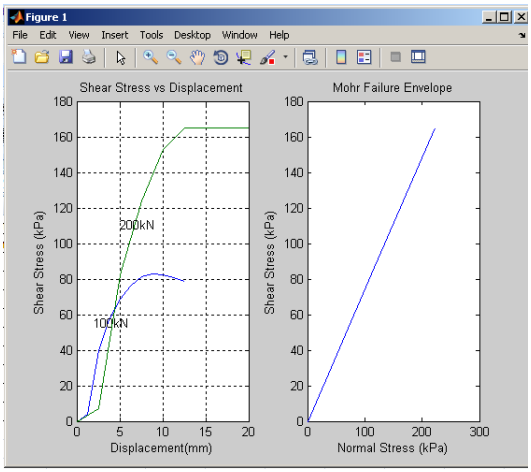
3. The trapezoidal rule is a method for finding an approximate value for a definite integral. Suppose we have the definite integral $I = \int_a^b f(x)dx$. In order to find an approximate value, the area under the curve f(x) is first divided into n strips, which does not necessarily have to be of equal width as shown below. The area of each strip is then approximated to be that of a trapezoid. The sum of these trapezoidal areas gives an approximation for our definite integral.



Q4)

An excel file (sheartest.xls) including shear test results of a 30mmx30mm sand specimen is available at www.ce.metu.edu.tr/~ce300. Note that this file has data in two sheets.

Write a script to plot the test results. Your script should give a "shear stress vs. displacement" graph for two axial loads and "maximum shear stress vs normal load" graph in one figure as shown. Name the figures and axis as shown.



Notes

1. In excel file, shear and normal forces are given. Make necessary calculation in order to convert forces to stresses.

2. Your maximum shear stress vs normal load graph should include three points. These points are *(0,0), (nor1,max1), (nor2,max2)* where nor 1 and nor 2 are normal stresses and max1 and max2 are maximum shear stresses corresponding to normal stress 1 and 2 respectively.

Q5)

Use contour plot function to obtain the circles formed by the variables x and y as shown below.

Hint: As can be seen from the figure -5≤x≤5 and -5≤y≤5