Mansoura University
Faculty of Engineering
Public works Dept.

15-1-2013.
Time : 3.00 hrs

ENGINEERING STATISTICS
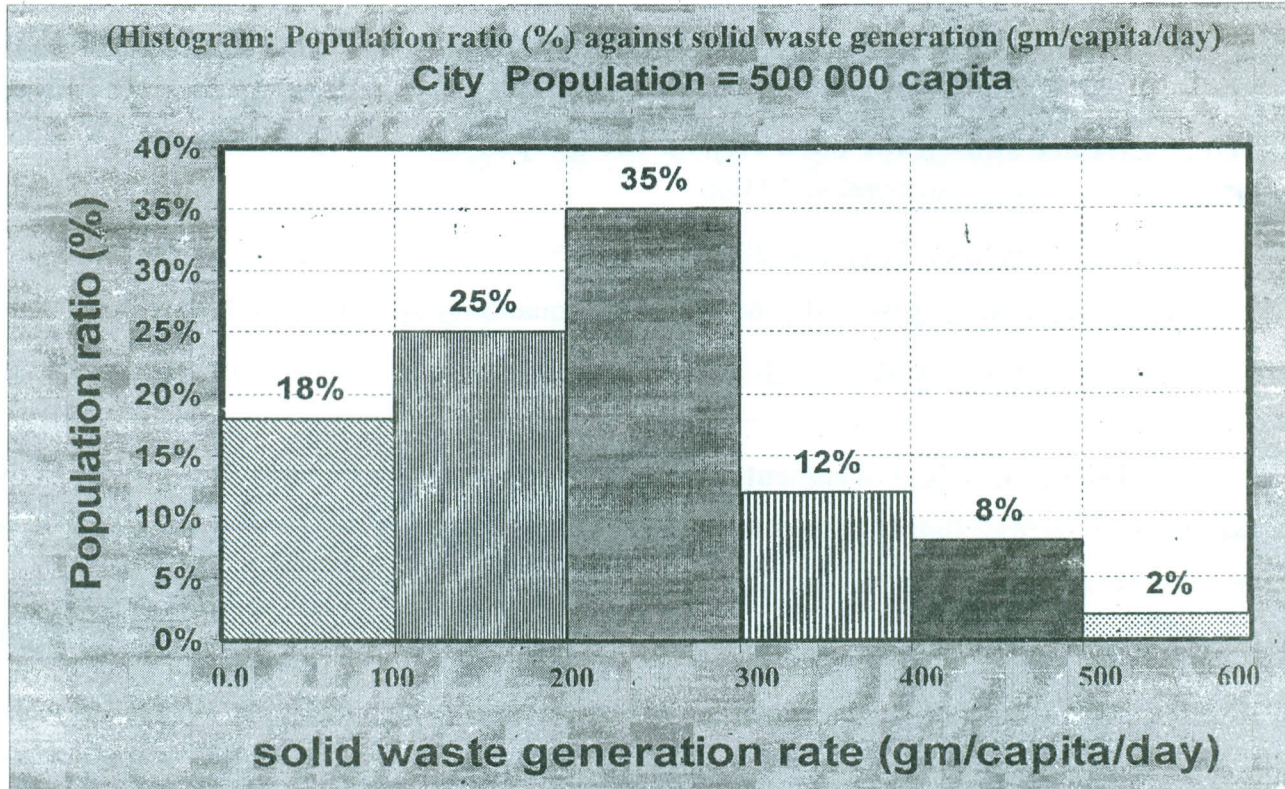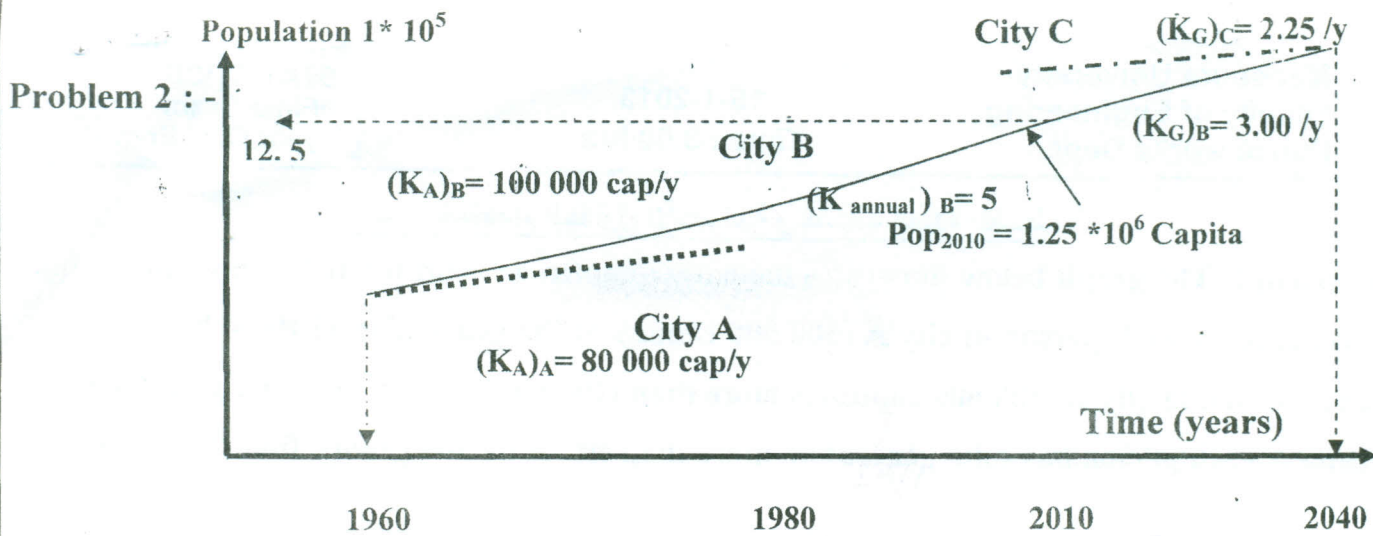**Final Exam**
1st year Civil Eng.

يسمح باستخدام الجداول الأحصائية و كتـــاب المادة فقــط

Problem 1, The graph below illustrates the daily quantity of solid waste (grams/capita) that produced by each person in city A (500 000 capita). If the generation of the solid waste for each person in city B (400 000 capita) is more than city A by 10%, while for city C (200 000 capita), each person has solid generation more than city A by 100 grams, find the following,

(Histogram: Population ratio (%) against solid waste generation (gm/capita/day)
City Population = 500 000 capita

a) Calculated the arithmetic, harmonic, and geometric mean, mode, median, quantity of solid waste as well as the parameters σ_{n-1}, Sk, and CV. for city A

b) Calculated the arithmetic mean, and the parameters σ_{n-1}, Sk, and CV, for cities B and C.

c) Estimate the annual accumulated solid waste for one year for all cities (A., B, and C) individually based on the arithmetic means.

d) Find the Heronian , logarithmic, and Identical means for the annual accumulated solid waste for cities B and C.

e) For city **A** estimate the number of persons, which having solid generation between 250-450 gram/day / capita, or (population = 0.5 million).

f) For city **A** estimate the number of persons, which having solid generation > 350 gm/d / capita.

g) For city **A** estimate the design solid waste rate, which accepted by 80 % of the population.

(40 points)

Problem 2 : -

Population $1*10^5$

City C $(K_G)_C = 2.25$ /y

12.5

City B

$(K_A)_B = 100\ 000$ cap/y

$(K_G)_B = 3.00$ /y

$(K_{annual})_B = 5$

$Pop_{2010} = 1.25 *10^6$ Capita

City A

$(K_A)_A = 80\ 000$ cap/y

Time (years)

1960   1980   2010   2040

If the population of city A and B were equal on 1960, while the population shall be equal of city B and C on 2040. The arithmetic (K_A), annual (K_{annual}), and geometric (K_G) constants are shown for each city on the graph, find the following,

a)   Population of city A on 1960 and 1980

b)   Population of city C on 2010 and 2040

(20 points)

c)   Population of city B on 2050 and 2060 and fit the equation [population $= n\ (time)^m$], n=m=const.

d)   At which year the city B is doubled city A (cities A and C have single increase rate)
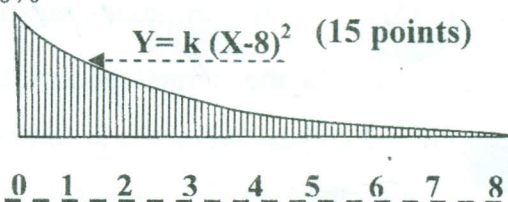

Problem 3 : The mean weight of cement sags must be greater than 50 kg with $\sigma = 5.0$ kg. If 10 sample were showed that their mean weight is 48 kg. Using $\alpha = 90\%$ find the following,

a) Discuss the acceptance of the samples mean.

b) If the samples has $\sigma = 6.0$ kg, it is less than the required value.

(15 points)

c) Find the critical values (just accepted) for the mean and the standard deviation of the sample.

Problem 4 : assume the probability function of the future earthquake (E-quake) with magnitude ranging 0 - 8 can be described with the shown figure, find the probability that ,

a)   E-quake with magnitude ranging from 3.0 -6.0 shall be accrued .

b)   Find the minimum E-quake magnitude with probability of 80%

c)   E-quake with magnitude of less than 3.5 shall be accrued

$Y = k\ (X-8)^2$ **(15 points)**

d)   A building with magnitude of 6.5 shall be damaged.

e)   What is the expected magnitude and its variance

0 1 2 3 4 5 6 7 8

Problem 5:

A city has steel, concrete, and wooden houses. Assume the mean Lifetime of steel, concrete, and wooden are 70, 60, 50 years respectively, with standard deviation of 12, 10, 8 years respectively. Use **t - distribution** curve with $\upsilon = 10$ to find the probability that,

a) No thing happen before 70 years

b) All houses shall be damaged before 60 years.

c) All houses shall be damaged exactly between 50-70 years

Best regards

(10 points)

Dr. Moharram Fouad