June 24,27,28, 2011

CE 300 SUMMER PRACTISE

MATLAB # 4 TOOLBOXES

ASSIGNMENT

1.

(a) A cantilever beam is subjected to a loading and the bending moment values occurring at the different points on the beam are recorded. Given in "matlab4_ex1.txt" are the observation point locations and the corresponding moment values.

It is known that the beam is subjected to triangular type of loading.

i. If you are asked to conduct a regression analysis on the given data set, what type of regression model will you use? Why?

ii. Using your answer to part (i) as the regression model, fit a curve to the given data set in order to find the bending moment equation along the beam. Report your answer with the coefficients of the curve and the goodness of fit parameters.

(b) The moment distribution on a cantilever beam is given by the following equation:

$$\frac{5}{2l^2}x^4 - \frac{10}{3l}x^3 - 5x^2 + 10lx - \frac{25}{6}l^2$$

where l is the length of the beam. For l=5,15 m:

I. Determine applied loading pattern and the shear distribution equations along the length of the beam.

II. Determine the minimum and maximum values of shear and bending moment.

III. Draw the shear and bending moment diagram.

2. Given in "matlab4_example2.xls" file is the annual distribution of the world populations (WP) and the average annual world population changes (WPC) between the years 2000 and 2049. Find the mean, median, mode, standard deviation and coefficient of variation for the variables WP and WPC.

3. Suppose that three jumpers are connected by to each other by bungee cords as shown in the figure.

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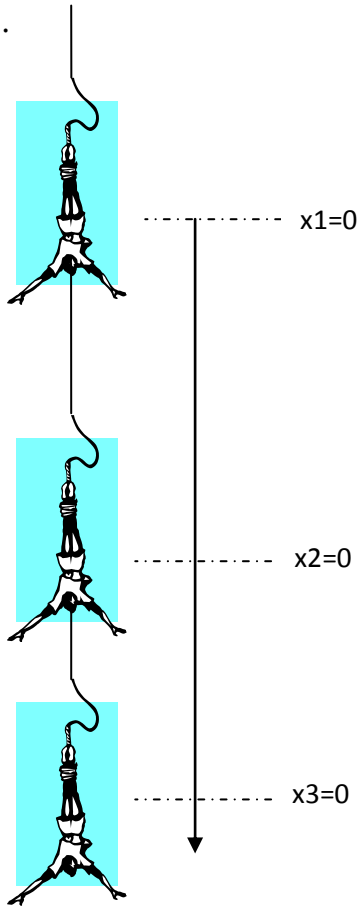

The distances x1, x2 and x3 are measured from each of the cords unstretched position. After the cords are released, the jumpers are subjected to gravity and the come to an equilibrium position. The parameters of the problem are as follows:

Jumper	**Mass (kg)**	**Spring Constant (N/m)**	**Unstretched Cord Length (m)**
Top(1)	60	50	20
Middle (2)	70	100	20
Bottom (3)	80	50	20

Compute the displacement of each jumper. Assume cords behave like linear springs (F=kx) and the cords are placed always in vertical position.

4. We used to play a game in high school: who will make the closest guess for the square root of a 5-digit number. Before the programmable calculator era, we played this as follows: One person presses five numbers on the calculator randomly (therefore make a random 5-digit number), then all players make guesses for the square root of the number, finally we press the square root button. Whoever guessed nearest to the answer wins.

Write a program that first generates a random 5-digit integer and outputs it on the screen. Then users input a one dimensional array of guesses (for the square root of the number) and the computer outputs "The answer is ???. Nearest guess belongs to player ?", where actual numbers must replace question marks.