**College of Engineering and Computing**

**Department of Civil and Environmental Engineering**

**CGN 2420 - Computer Tools for Engineers**

**HOMEWORK 1:**

**1.- a)** The values shown in the following table relate the height of material in a cylindrical tank and the corresponding mass of solids. Find the best curve(s) to fit this data (linear and/or polynomial). Then use these functions to predict the height of solids in the tank given the mass of solids. Calculate the height of material for mass = 3200 Kg, and mass = 20000 Kg.

|  |  |
| --- | --- |
| **h (ft)** | **m(lb)** |
| 0 | 0 |
| 2 | 56 |
| 4 | 447 |
| 6 | 1508 |
| 8 | 3574 |
| 10 | 6981 |
| 12 | 11470 |
| 14 | 16000 |
| 16 | 20520 |
| 18 | 25040 |
| 20 | 29570 |
| 22 | 34090 |
| 24 | 38620 |

**b)** Dimensions of this tank are ** = 30o, D = 12 ft, and density of solids in the tank is 20 lb/ft3. Perform the calculations in Excel to obtain the mass values given in the table.

**2.-** The data given in file HW\_Rainfall\_Data.xls shows the amount of precipitation, measured in inches, per month and per year from 1914 to 1997.

a.- Determine mean value of total rainfall per month and the corresponding standard deviation for these 84 years.

b.- Plot the previous results (Mean rainfall vs. months of the year) in a column graph and predict during which month of the year we can expect the largest precipitation.

c.- Create a histogram to show the frequency distribution of total amount of rainfall/year. Use intervals (bins) of 2 inches, starting with 39.5 and finishing with 83.5 inches.

d.- Plot the cumulative frequency corresponding with this histogram, and determine the probability of having a total rainfall per year between 60 and 70 inches.

**3.-** The nodal displacements of a crane can be found by solving the equilibrium equations:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **170.4105** | **37.9473** | **--113.8420** | **-37.9473** |  | **u1** |  | **P1** |
| **37.9473** | **69.2176** | **-37.9473** | **-12.6491** |  | **u2** | **=** | **P2** |
| **-113.8420** | **-37.9473** | **120.9131** | **45.0184** |  | **u3** |  | **P3** |
| **-37.9473** | **-12.6491** | **45.0184** | **19.7202** |  | **u4** |  | **P4** |

where the *ui* ’sare the nodal displacements (inch) and *Pi* the load applied (lb) along the direction of *ui* . Find the nodal displacements for *P1* = *P2* = 0, *P3* = 100 and *P4* =50.

Use matrices to find your answer.

**Due date:** Tuesday July 19, 2011

**Please submit your Homework on time to the following gmail account:**

[**egn1100.section1@gmail.com**](mailto:egn1100.section1@gmail.com)

**Use only ONE Excel file, with each problem in a different spreadsheet. Save the file with your NAME and LASTNAME.**

**Homework that has not been submitted in this way will not be graded.**