

ChE-101: Approaches to Chemical Engineering Problem Solving  
Homework #3  
Spring 08  
Due 04/30/08

All sections must submit electronic files by 11:00 am  
Flowchart diagrams must be submitted to Dr. Botte during the class period on 04/30/08

Submission Instructions:

1. The Matlab programs should be submitted by e-mail to [che101@bobcat.ent.ohiou.edu](mailto:che101@bobcat.ent.ohiou.edu). The title of your e-mail should be Homework 3-yourlastname-SectionXX (e.g., Homework 3-Miller-Section01).
  - a. The e-mail should contain the script file (m files) for problem 2. Your m file should be named: P2\_hw3\_lastname (e.g., P2\_hw3\_botte.m).
2. Remember that the matlab files **should have the extensions .m** any other format will not be accepted or graded. Make sure that you receive a confirmation e-mail that I had received your homework. If you don't contact me immediately (see p. 3 of the Class Syllabus).
3. The flowchart diagrams for both problems (hard copies) should be submitted to Dr. Botte during the class period on the due date. Make sure that you have your names on them and that you include the names of the script files that were built using the flowchart diagrams (we are going to need them to grade your code). Follow the homework standards described on p. 3 of the Class Syllabus)

**Problem 1: Matrix Operations**

**Part a: (10 points)**

Multiply the two matrices given below (do it using the procedure explained in H-3, hand calculation as we did in class). Verify your answer using matrix operations in the command window of Matlab (see T-III). Printout the results of the command window to support your calculations.

$$\begin{bmatrix} -2 & 4 & 1 \\ 4 & 0 & 2 \end{bmatrix} \begin{bmatrix} 1 & -5 & 2 \\ -3 & -1 & -2 \\ -1 & 4 & 3 \end{bmatrix}$$

**Part b: (20 points)**

Given the matrices A and B perform the calculations described below (do it using the procedures explained in H-3, hand calculation as we did in class). Verify your answers using matrix operations in the command window of Matlab (see T-III). Printout the results of the command window to support your calculations.

$$A = \begin{bmatrix} 12.2 & 14.1 \\ 8.5 & 0.6 \end{bmatrix}$$

$$B = \begin{bmatrix} 1.3 & -2.6 \\ 7.5 & 3.8 \end{bmatrix}$$

$$C1=A+B \quad C2=B-A \quad C3=A*B \quad C4=B*A$$

**Problem 2 (30 points)**

Several cans of liquid sample are bought to you for analysis for copper. The sample volume, density and mass fraction of copper in solution are measured.

Sample #	1	2	3	4	5	6	7
Total volume (l)	13.4	8.2	6.2	17.9	10.8	12.9	9.7
Overall density (kg/l)	0.85	0.81	0.94	0.78	0.81	0.89	0.90
Mass fraction of Copper (mass of copper/total mass)	0.17	0.22	0.31	0.15	0.27	0.15	0.11

Build a flowchart diagram and a Matlab program that will allow you to:

1. Determine which sample has the lowest total mass and what is the lowest total mass
2. Determine what is the largest mass of copper in any of the samples and identify the sample number
3. Determine the total mass of copper in each sample

YOU MUST SOLVE THIS PROBLEM USING ARRAYS AND VECTORS.  
OTHERWISE IT WON'T BE GRADED.