SCSI1113: Computational Mathematics 2018/2019 Semester 2

ASSIGNMENT 1.1 (Dateline of susmission:10 March 2019)

1. Given

$$A=\begin{bmatrix}3 & a\\1 & a+b\end{bmatrix}, B=\begin{bmatrix}b & c-2d\\c+d & 0\end{bmatrix}, C=\begin{bmatrix}1 & -7 & 2\\5 & 3 & 0\end{bmatrix}, D=\begin{bmatrix}4 & 9\\-3 & 0\\2 & 1\end{bmatrix}, E=\begin{bmatrix}3 & 6 & -9\\0 & 0 & -2\\-2 & 1 & 5\end{bmatrix},$$

Find

a) Values of a,b,c,d if A and B are equal matrices.

b) $3C^T-2D$

c) $(C^T D^T)E$

d) $|E|$ by a cofactor expansion along the second column then find E^{-1}

2. Formulate and solve the following problems using Gaussian elimination.

a) A dietitian wishes to plan a meal around three foods. The percent of the daily requirements of proteins, carbohydrates, and iron contained in each ounce of the three foods is summarized in the accompanying table:

	Food I	Food II	Food III
Protein (%)	10	6	8
Carbohydrates (%)	10	12	6
Iron (%)	5	4	12

Determine how many ounces of each food the dietitian should include in the meal to meet exactly the daily requirement of proteins, carbohydrates, and iron (100% each).

b) An executive of Trident Communications recently travelled to London, Paris, and Rome. He paid \$180, \$230, and \$160/night for lodging in London, Paris, and Rome, respectively, and his hotel bills totaled \$2660. He spent \$110, \$120, and \$90/day for his meals in London, Paris, and Rome, respectively, and his expenses for meals totaled \$1520. If he spent as many days in London as he did in Paris and Rome combined, how many days he stay in each city?

3. Find the LU factorization of the matrix A using Doolittle form.

$$A=\begin{bmatrix}1 & 1 & 0 & 3\\2 & 1 & -1 & 1\\3 & -1 & -1 & 2\\-1 & 2 & 3 & -1\end{bmatrix}$$

4. Let **u** = **u** = (5, 4, -3) and **v** = (1,-2,-1). Find

a) The angle between **u** and **v.**

b) **u** x **v**

5. Consider the vectors **u** = (1, -3, 2) and **v**=(2, -1, 1) in $\mathbf{R}^3$.

a) For which value of k is (1, k, 5) is a linear combination of **u** and **v**?

b) Determine whether **u** and **v** are linearly independent.