18.06 Problem Set 2

Due Wednesday, Feb. 21, 2007 at **4:00 p.m.** in 2-106

Each problem is worth 10 points. The date next to the problem number indicates the lecture in which the material is covered.

Problem 1 *Monday 2/12*

Use Gauss-Jordan elimination to find the inverse of $A = \begin{bmatrix} 1 & 4 & 2 \\ 1 & 4 & 1 \\ 2 & 10 & 5 \end{bmatrix}$.

Problem 2 *Monday 2/12*

Do problem 29 of section 2.5 in your book.

Problem 3 *Monday 2/12*

Do problem 32 of section 2.5 in your book.

Problem 4 *Wednesday 2/14*

Do problem 11 of section 2.6 in your book.

Problem 5 *Wednesday 2/14*

Compute the LU decomposition for the matrix

$$A = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 2 & 2 & 2 \\ 1 & 2 & 3 & 3 \\ 1 & 2 & 3 & 4 \end{bmatrix}.$$

Problem 6 *Wednesday 2/14*

Do problem 16 of section 2.6 in your book.

Problem 7 *Friday 2/16*

Let $P = P_{45}P_{16}P_{56}P_{12}P_{34}$, where the P_{ij} are permutation matrices of order 6.

(a) What is $P \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \end{bmatrix}$?

(b) What is P?

Problem 8 *Friday 2/16*

Do problem 16 of section 2.7 in your book.

Problem 9 *Friday 2/16*

Let $A = \begin{bmatrix} 2 & 6 & 5 \\ 3 & 9 & 1 \\ 1 & 2 & 3 \end{bmatrix}$.

Compute an LU factorization of A if one exists, or find a permutation matrix P such that $PA = LU$ otherwise.

Problem 10 *Friday 2/16*

Are the following statements true or false? For each statement explain why it is true or give a counterexample if it is false. All matrices are assumed to be square.

(a) The product of two upper triangular matrices is an upper triangular matrix.

(b) The product of two symmetric matrices is a symmetric matrix.

(c) The product of two permutation matrices is a permutation matrix.

(d) The inverse of a lower triangular matrix is lower triangular, if it exists .