

18.06 Problem Set 3

Due Thursday, 30 September 2010 at 4pm in the correct location for your recitation. Please note that the problems from the textbook are out of the 4th edition: make sure to check that you are doing the correct problems.

Even if it is not explicitly asked in the exercise you need to explain (write down the way you got to) all solutions.

Each Problem worth 10 points.

1. Find the LU and the reduced row echelon matrix for

$$A = \begin{pmatrix} 2 & 4 & 6 & 8 & 4 \\ 4 & 11 & 15 & 24 & 14 \\ 2 & 10 & 12 & 28 & 24 \end{pmatrix}$$

Compute the column space $C(A)$ and the null space $N(A)$ for A . Give all solutions for the system

$$A\mathbf{x} = \begin{pmatrix} 8 \\ 25 \\ 34 \end{pmatrix}$$

2. Do problem 9 from section 3.2.
3. Do problem 25 from section 3.2.
4. Do problem 8 from section 3.3.
5. Do problem 23 from section 3.3.
6. Do problem 3 from section 3.4.
7. Do problem 32 from section 3.4.
8. Do problem 10 from section 3.5.
9. Do problem 26 from section 3.5.
10. In a matrix, a “zero path” is a chain of adjacent zeros. (Adjacent here means horizontally or vertically adjacent.) We say the matrix has one connected zero component if any two zeros are connected by a zero path. (The identity matrix clearly has two connected zero components.)

Count by hand, by listing, using the computer, or otherwise, the number of 4×4 permutation matrices with exactly one connected zero component. You need not write down every matrix, but you must argue that you counted correctly.

Optional: let me know if you can get answers for $n \times n$ for $n=1:20$ or so. If you do, send me your answer. Not exactly extra credit officially, but your professor will be impressed.