18.06 (Fall '11) Problem Set 7

This problem set is due Thursday, November 3, 2011 at 4pm. The problems are out of the 4th edition of the textbook. For computational problems, please include a printout of the code with the problem set (for MATLAB in particular, `diary("filename")` will start a transcript session, `diary off` will end one.)

Every problem will be worth 25 points. Study hard for the exam.

1. Suppose $n > 1$. Prove that the determinant of an n by n matrix with every entry equal to 1 or -1 is even.

2. Take the first matrix from problem 14 from 5.1. Calculate its determinant in at least 2 different ways that you've learned so far.

3. Do problem 34 from 5.2.

4. Do problem 20 from 5.3.

Bonus Problem (worth 0 points, but may help you study): take a 2 by 3 grid with an empty square: $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & \end{bmatrix}$. You can "slide" any number adjacent to the empty square by swapping it with the empty square. Prove you cannot get to the position $\begin{bmatrix} 1 & 2 & 3 \\ 5 & 4 & \end{bmatrix}$. Hint: associate the state of the grid with a 6 by 6 permutation matrix. What happens to the determinant every time you slide?

18.06 Wisdom. Alan likes things like networks and Fourier series.