18.06 Problem Set 1
Due Wednesday, 13 February 2008 at 4 pm in 2-106.

Problem 1: Do problem 28 from section 1.1 (pg. 10) in the book.

Problem 2: Do problem 31 from section 1.2 (pg. 20).

Problem 3: For the system $A\mathbf{x} = \mathbf{b}$ (where A is a 3-by-3 matrix), choose A and $\mathbf{b}$ so that:

1. (row picture) the three planes meet in a common line

2. (row picture) all three planes are parallel but distinct

3. (row picture) the intersection of the first two planes does not intersect the third plane

4. (column picture) $\mathbf{b}$ is not a linear combination of the columns of A

5. (column picture) $\mathbf{b}$ is a multiple of the second column of A

Problem 4: Do problem 5 from section 2.2 (pg. 42).

Problem 5: Do problem 12 from section 2.2 (pg. 43).

Problem 6: Do problem 19 from section 2.2 (pg. 44).

Problem 7: Do problem 23 from section 2.3 (pg. 54).

Problem 8: Define the matrix $A = \begin{pmatrix} 1 & 0 & 2 \\ 2 & -1 & 3 \\ 4 & 1 & 8 \end{pmatrix}$. Find a matrix B so that BA is upper triangular. (Hint: first find the elimination matrices for A.)

Problem 9: Do problem 27 in section 2.3 (pg. 55)

Problem 10: Let's do a warm-up Matlab question. Please include a printout of your Matlab code with your problem set! You can type **diary('filename')** at the beginning of your session to save a transcript, and **diary off** when you're done.

Let's check that in general the products of matrices AB and BA are not equal. (However, as we'll see later, some properties of the two products are the same.) We start with matrices of different sizes. Type in the commands **A=ones(3,2)** and **B=ones(2,3)** (that is, A and B are the 3-by-2 and 2-by-3 matrices with all entries equal to 1). Compute **A*B** and **B*A**. What are their sizes?

Now multiply 3 by 3 matrices C (your choice) and a random D (use the command **D = rand(3,3)**). Does $CD = DC$? Do their diagonals have the same sum (this is called the trace)? Find inv(C) and inv(D).