18.06 Spring 2012 – Problem Set 6

This problem set is due Thursday, April 5th, 2012 at 4pm (hand in to Room 2-106). The textbook problems are out of the 4th edition. 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 is worth 10 points.

1. Do Problems 9 & 15 from Section 5.1.
2. Do Problems 18 & 22 from Section 5.1.
3. Do Problems 8 & 9 from Section 5.2.
4. Do Problem 20 from Section 5.2.
5. Do Problem 29 from Section 5.2.
6. Do Problem 34 from Section 5.2.
7. Do Problems 4 & 8 from Section 5.3.
8. Do Problems 20 & 25 from Section 5.3.
9. Do Problem 1 from Section 6.1.
10. Use MATLAB to "prove" all the facts you remember (or may not remember?) about determinants. First define the following matrices to test on (copy paste into MATLAB - retyping is time- and patience-consuming):

```
%Two random 4 x 4 matrices:
A = rand(4,4);
B = rand(4,4);

%An elementary subtraction of rows (by left-multiplying. Of columns if you right-)
E = [1 -3  0  0;
     0  1  0  0;
     0  0  1  0;
     0  0  0  1];

%An "odd" permutation:
P_odd = [1  0  0  0;
         0  1  0  0;
         0  0  0  1;
         0  0  1  0];

%An "even" permutation:
P_even = [0  1  0  0;
```

```
          1  0  0  0;
          0  0  0  1;
          0  0  1  0];

%Another 4 x 4...almost, the 1st row is missing:
C = rand(3,4);

%Two random row vectors
a1 = rand(1,4);
a2 = rand (1,4);

%Two matrices having the a_1, a_2 as 1st rows
D1 = [a1;
      C ]

D2 = [a2;
      C ]
%Matrix with sum as 1st row
D = [a1 + a2;
        C  ]
```

Now, using these matrices do the following tests. We've slipped in a couple of *false* ones - to make it more exciting (take a guess before you hit < `enter` >).

(a) $\texttt{det(D1)} + \texttt{det(D2)} = \texttt{det(D)}$

(b) $\texttt{det(A)} + \texttt{det(B)} = \texttt{det(A + B)}$

(c) $\texttt{det(10 * A)} = 10 * \texttt{det(A)}$

(d) $\texttt{det(E * A)} = \texttt{det(A)} = \texttt{det(A * E)}$

(e) $\texttt{det(P\_odd * A)} = -\texttt{det(A)}$
$\texttt{det(P\_even * A)} = \texttt{det(A)}$

Which ones in (a)-(e) are correct, and which are false?

18.06 Wisdom. Enjoy your spring break!