Math 310, Lesieutre
Problem set #6
October 7, 2015

Problems for M 9/28:

3.1.1 Compute the determinant of the following matrix by using cofactor expansion across the first row. Also compute it using cofactor expansion down the second column. (You should get the same answer either way.)

$$\begin{vmatrix} 3 & 0 & 4 \\ 2 & 3 & 2 \\ 0 & 5 & -1 \end{vmatrix}.$$

3.1.4 Same deal, for

$$\begin{vmatrix} 1 & 2 & 4 \\ 3 & 1 & 1 \\ 2 & 4 & 2 \end{vmatrix}.$$

3.1.9 Compute the determinant by cofactor expansion. At each step, choose a row or column that involves the least amount of computation. (You'll want to pick rows or columns with lots of zeroes if you can.)

$$\begin{vmatrix} 4 & 0 & 0 & 5 \\ 1 & 7 & 2 & -5 \\ 3 & 0 & 0 & 0 \\ 8 & 3 & 1 & 7 \end{vmatrix}$$

3.1.15 Compute the following 3×3 determinant by adding up the products of the downward diagonals and subtracting the products of the upward diagonals.

$$\begin{vmatrix} 1 & 0 & 4 \\ 2 & 3 & 2 \\ 0 & 5 & -2 \end{vmatrix}$$

3.1.19 Compute the determinants of the following two matrices. Say which row operation relates them, and deduce how performing that row operation changes the determinant.

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix}, \quad \begin{bmatrix} c & d \\ a & b \end{bmatrix}$$

Problems for W 9/30:

None! That day was the midterm. You can try some extra practice determinants if you are looking for something to do – the more the better.

Problems for F 10/2:

3.2.5 Find the determinant using row reduction to echelon form.

$$\begin{vmatrix} 1 & 5 & -4 \\ -1 & -4 & 5 \\ -2 & -8 & 7 \end{vmatrix}.$$

3.2.11 Combine the methods of row reduction and cofactor expansion to compute the following determinant.

$$\begin{vmatrix} 3 & 4 & -3 & -1 \\ 3 & 0 & 1 & -3 \\ -6 & 0 & -4 & 3 \\ 6 & 8 & -4 & -1 \end{vmatrix}.$$

3.2.24 Use determinants to decide if these vectors are linearly independent:

$$\begin{bmatrix} 4 \\ 6 \\ 2 \end{bmatrix}, \quad \begin{bmatrix} -7 \\ 0 \\ 7 \end{bmatrix}, \quad \begin{bmatrix} -3 \\ -5 \\ -2 \end{bmatrix}.$$

3.2.29 Compute $\det B^4$, where

$$B = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 2 \\ 1 & 2 & 1 \end{bmatrix}.$$