MATH 3110 - Fall 2018

Homework 5

Due: Wednesday, October 17th

Note the following:

(a) Homework is due at the beginning of class.

(b) Use only one side of each sheet of paper and staple them together.

(c) State the problem before writing the solution.

(d) SHOW your work. Even if it's true but you did not show it, you will receive only very little credit.

(e) Late homework will NOT be accepted.

Exercise 1 (6 points):

Find the relation between $\det(A)$ and $\det(B)$ in the following cases. Justify your answer.

(a) $A = \begin{bmatrix} 1 & -1 & 1 \\ -3 & 5 & 2 \\ 2 & -1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} -c & c & -c \\ -3 & 5 & 2 \\ 2 & -1 & 3 \end{bmatrix}$

(b) $A = \begin{bmatrix} 2 & 0 & -3 \\ -1 & -1 & 0 \\ 2 & -3 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2-c & -c & -3 \\ -1 & -1 & 0 \\ 2 & -3 & 1 \end{bmatrix}$

(c) $A = \begin{bmatrix} 0 & 4 & -3 \\ 1 & 2 & -3 \\ 0 & -1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 & -3 \\ 0 & 4 & -3 \\ 0 & -1+4c & 1-3c \end{bmatrix}$

Exercise 2 (5 points):

(a) Compute the determinant of the following matrix using cofactor expansion.

$$A = \begin{bmatrix} -2 & -4 & 0 \\ 7 & 6 & 2 \\ 7 & 7 & 1 \end{bmatrix}$$

(b) Compute the determinant of the following matrix using row reduction

$$B = \begin{bmatrix} 2 & 5 & 4 & -3 \\ 1 & 3 & 3 & -4 \\ 0 & 1 & 2 & -5 \\ -3 & -7 & -5 & 2 \end{bmatrix}$$

Exercise 3 (5 points):

Use the adjoint inverse formula to compute the inverse of the following matrix

$$D = \begin{bmatrix} 0 & 1 & 0 \\ 5 & 1 & 3 \\ 2 & -2 & 1 \end{bmatrix}$$

Exercise 4 (4 points):

Show that if A is invertible, then $\det(A^{-1}) = \dfrac{1}{\det(A)}$.