Linear Algebra
Assignment 7 MATH 2318 (Fall 2022)

Deadline: Friday October 21st, 11:59pm.

Policy to turn in assignment:

- Assignment should be submitted via BlackBoard.
- Student needs to turn in their assignment as a single PDF file.
- No email or late submission will be accepted.

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5 points 1. Let $A = \begin{bmatrix} -3 & 2 & 4 \\ 1 & -1 & 2 \\ -1 & 4 & 0 \end{bmatrix}$.

a) Compute $\det A$ by using any of the algorithms we saw in class.

b) Let B be a 3×3 matrix such that $\det B = 2$. Compute $\det(4BA^{-1})$.

4 points 2. Let $A = \begin{bmatrix} -1 & c-1 & 1-c \\ -c-2 & 2c-3 & 4-c \\ -c-2 & c-1 & 2 \end{bmatrix}$. Use a determinant to find all the values of c for which A is not invertible. Use any algorithm from class.

3 points 3. Let A be an $n \times n$ matrix such that $A^T A = I_n$. Show that $\det(A) = \pm 1$.

4 points 4. For each of the following, determine if the statement is true or false. Provide a short reasoning (one or two sentences).

a) If the determinant of a square matrix is zero, then the matrix has either one row or column of zeros.

b) Let A be an $n \times n$ matrix, and let $\vec{b}$ be a given vector in $\mathbb{R}^n$. If the system $A\vec{x} = \vec{b}$ is consistent, then $\det A \neq 0$.

c) If the columns of a square matrix A are linearly dependent, then $\det A = 0$.

d) If A is a square matrix whose diagonal entries are all zero, then $\det A = 0$.