MATH1009 – Quiz M1b
Wednesday, February 20, 2019
Instructor: Abuzer Yakaryılmaz

Name and surname:

Student number:

Questions

(30 minutes / 5 points in total)

Remember the following two facts:

- If a given matrix, say A, is row–equivalent to a matrix containing a zero row, then A is singular.
- If $n \times n$ matrix A is row–equivalent to I_n, then A is non–singular (invertible).

1. (1 point)
   Let $A = \begin{bmatrix} -1 & 2 & 1 \\ 3 & 0 & -1 \\ 0 & -2 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -3 & 2 \\ 0 & -5 & 1 \\ -1 & 2 & 3 \end{bmatrix}$ be two matrices.
   Calculate the matrix $C = -3A + 2B$.

2. (1 point) Find the matrices D and E given below.

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

$$E = \begin{bmatrix} -1 \\ 2 \\ 3 \\ 1 \end{bmatrix} \cdot \begin{bmatrix} -1 & 2 & 3 & 1 \end{bmatrix}$$

3. (2 points) Show that the matrix F given below is non–singular.

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

4. (1 point) For which value(s) of $x \in \mathbb{R}$, the matrix $G = \begin{bmatrix} 1 & x \\ x & 1 \end{bmatrix}$ is singular?

During the exam, please do not use any electronic device or any course (related) material.