313 first midterm test
All computations must be provided. Using outside help is strongly prohibited. You must write down the test within 2 hours and then you have 1 hour to email it to: zoltan.szabo@lehman.cuny.edu as a picture or scanned PDF.

1. Solve the following two separate systems by Gauss-Jordan elimination:

$$\begin{aligned} 2x_1 + 2x_2 + 2x_3 &= 0 \\ -2x_1 + 5x_2 + 2x_3 &= 1 \\ 8x_1 + x_2 + 4x_3 &= -1 \end{aligned} \qquad \begin{aligned} 3x_1 + x_2 + x_3 &= 2 \\ x_1 - x_2 + x_3 &= 1 \\ 6x_1 + 2x_2 + 2x_3 &= 4 \end{aligned}$$

2. Compute $(9A)^{-1}$, where $A = \begin{pmatrix} 5 & 1 \\ 0 & 2 \end{pmatrix}$.

3. Consider matrix $A = \begin{pmatrix} 1 & 0 \\ -8 & 3 \end{pmatrix}$. Find elementary matrices E_1 and E_2 such that $E_2E_1A = I$.

4. Find the inverse of $A = \begin{pmatrix} 2 & 6 & 6 \\ 2 & 7 & 6 \\ 2 & 7 & 7 \end{pmatrix}$ by Gauss-Jordan elimination.

5. Find the determinant of matrix $\begin{pmatrix} 4 & 2 & -1 \\ 0 & 2 & -3 \\ -1 & 1 & 5 \end{pmatrix}$ by Gauss elimination.

6. Find the inverse of $\begin{pmatrix} 2 & -3 & 5 \\ 0 & 1 & -3 \\ 0 & 0 & 2 \end{pmatrix}$ by the cofactor formula.

7. Solve

$$\begin{aligned} 4x + 5y &= 2 \\ 11x + y + 2z &= 3 \\ x + 5y + 2z &= 1 \end{aligned}$$

by Cramer's rule.