

Math 2418 Linear Algebra Quiz #1
 Aug 29-30, 2001

1.) Find the following matrices for the system of linear equations given below (DO NOT SOLVE):

$$\begin{aligned} 2x_1 + 2x_2 - 5x_3 &= 1 \\ 4x_1 + 4x_2 - 9x_3 &= -1 \\ -2x_1 - 2x_2 + 4x_3 &= 2 \end{aligned}$$

$$\begin{bmatrix} 2 & 2 & -5 & 1 \\ 4 & 4 & -9 & -1 \\ -2 & -2 & 4 & 2 \end{bmatrix} \xrightarrow{R_2 - 2R_1 \rightarrow R_2, R_3 + R_1 \rightarrow R_3} \begin{bmatrix} 2 & 2 & -5 & 4 \\ 0 & 0 & 1 & -3 \\ 0 & 0 & -1 & 3 \end{bmatrix} \xrightarrow{R_3 + R_2 \rightarrow R_3}$$

$$\begin{bmatrix} 2 & 2 & -5 & 4 \\ 0 & 0 & 1 & -3 \\ 0 & 0 & 0 & 0 \end{bmatrix} \xrightarrow{R_1 + 5R_2 \rightarrow R_1} \begin{bmatrix} 2 & 2 & 0 & -11 \\ 0 & 0 & 1 & -3 \\ 0 & 0 & 0 & 0 \end{bmatrix} \xrightarrow{R_1/2 \rightarrow R_1} \begin{bmatrix} 1 & 1 & 0 & -\frac{11}{2} \\ 0 & 0 & 1 & -3 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

[3] 1a.) Augmented Matrix Form:
$$\underline{\begin{bmatrix} 2 & 2 & -5 & 1 \\ 4 & 4 & -9 & -1 \\ -2 & -2 & 4 & 2 \end{bmatrix}}$$

[5] 1b.) Reduced Echelon Form:
$$\underline{\begin{bmatrix} 1 & 1 & 0 & -\frac{11}{2} \\ 0 & 0 & 1 & -3 \\ 0 & 0 & 0 & 0 \end{bmatrix}}$$

2.) Solve each of the following systems of linear equations for the variables x_1, \dots, x_n .

[4] 2a.)
$$\begin{bmatrix} 1 & 0 & 0 & 5 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 0 \end{bmatrix} \quad \text{Answer 2a.) } \underline{\begin{aligned} x_1 &= 5 \\ x_2 &= 2 \\ x_3 &= 0 \end{aligned}}$$

[4] 2b.)
$$\begin{bmatrix} 0 & 1 & 0 & 4 & 0 \\ 0 & 0 & 1 & -1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} \quad \text{Answer 2b.) } \underline{\text{no solution}}$$

[4] 2c.)
$$\begin{bmatrix} 0 & 1 & 0 & 4 & 5 \\ 0 & 0 & 1 & -1 & 2 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix} \quad \text{Answer 2c.) } \underline{\begin{aligned} x_1 &= t \\ x_2 &= 5 - 4s \\ x_3 &= 2 + s \\ x_4 &= s \end{aligned}}$$