

1-2 In-Class Exercise

1.

- (a) If A is a 3×5 matrix, then what is the maximum possible number of leading 1's in its reduced row echelon form?
- (b) If B is a 3×6 matrix, and B is not a zero matrix, then what is the maximum possible number of parameters in the general solution of the linear system with augmented matrix B ?
- (c) If C is a 5×3 matrix, then what is the minimum possible number of rows of zeros in any row echelon form of C ?

1-2 Suggested Exercise

1. Discuss the existence and uniqueness of solutions to the corresponding linear systems.

$$(a) \begin{bmatrix} 1 & -3 & 7 & 2 & 5 \\ 0 & 1 & 2 & -4 & 1 \\ 0 & 0 & 1 & 6 & 9 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

$$(b) \begin{bmatrix} 1 & -3 & 7 & 2 & 5 \\ 0 & 1 & 2 & -4 & 1 \\ 0 & 0 & 1 & 6 & 9 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$(c) \begin{bmatrix} 1 & -3 & 7 & 2 & 5 \\ 0 & 1 & 2 & -4 & 1 \\ 0 & 0 & 1 & 6 & 9 \\ 0 & 0 & 0 & 1 & 0 \end{bmatrix}$$

2. Solve the linear system.

$$\begin{aligned}Z_3 + Z_4 + Z_5 &= 0 \\-Z_1 - Z_2 + 2Z_3 - 3Z_4 + Z_5 &= 0 \\Z_1 + Z_2 - 2Z_3 - Z_5 &= 0 \\2Z_1 + 2Z_2 - Z_3 + Z_5 &= 0\end{aligned}$$

3. What condition, if any, must a , b , and c satisfy for the linear system to be consistent?

$$\begin{aligned}x + 3y + z &= a \\-x - 2y + z &= b \\3x + 7y - z &= c\end{aligned}$$

4. Solve the following systems, where a , b , and c are constants.

$$\begin{aligned}x_1 + x_2 + x_3 &= a \\2x_1 + 2x_3 &= b \\3x_2 + 3x_3 &= c\end{aligned}$$