

Math 202 Quiz # 6-B

Name: Solution I.D. # _____ Section # _____

1. Solve the following system:
- $$\begin{aligned} 2x_1 + 3x_2 + 3x_3 - x_4 &= 3 \\ 5x_1 + 7x_2 + 4x_3 + x_4 &= 5 \\ x_1 + x_2 - 2x_3 + 3x_4 &= 4 \end{aligned}$$

$$\left[\begin{array}{cccc|c} 2 & 3 & 3 & -1 & 3 \\ 5 & 7 & 4 & 1 & 5 \\ 1 & 1 & -2 & 3 & 4 \end{array} \right]$$

$$\xrightarrow{R_1 \leftrightarrow R_3} \left[\begin{array}{cccc|c} 1 & 1 & -2 & 3 & 4 \\ 5 & 7 & 4 & 1 & 5 \\ 2 & 3 & 3 & -1 & 3 \end{array} \right]$$

$$\xrightarrow{\substack{-5R_1 + R_2 \\ -2R_1 + R_3}} \left[\begin{array}{cccc|c} 1 & 1 & -2 & 3 & 4 \\ 0 & 2 & 14 & -14 & -15 \\ 0 & 1 & 7 & -7 & -5 \end{array} \right]$$

$$\xrightarrow{\frac{1}{2}R_2} \left[\begin{array}{cccc|c} 1 & 1 & -2 & 3 & 4 \\ 0 & 1 & 7 & -7 & -\frac{15}{2} \\ 0 & 1 & 7 & -7 & -5 \end{array} \right]$$

$$\xrightarrow{-R_2 + R_3} \left[\begin{array}{cccc|c} 1 & 1 & -2 & 3 & 4 \\ 0 & 1 & 7 & -7 & -\frac{15}{2} \\ 0 & 0 & 0 & 0 & \frac{5}{2} \end{array} \right]$$

\Rightarrow The system has no solution.

2. Let $A = \begin{bmatrix} 1 & 0 & 2 \\ 2 & -1 & 3 \\ 4 & 1 & 8 \end{bmatrix}$. Find the inverse of A, if it exists.

$$\left[\begin{array}{ccc|ccc} 1 & 0 & 2 & 1 & 0 & 0 \\ 2 & -1 & 3 & 0 & 1 & 0 \\ 4 & 1 & 8 & 0 & 0 & 1 \end{array} \right]$$

$$\begin{array}{l} -2R_1 + R_2 \\ -4R_1 + R_3 \end{array} \rightarrow \left[\begin{array}{ccc|ccc} 1 & 0 & 2 & 1 & 0 & 0 \\ 0 & -1 & -1 & -2 & 1 & 0 \\ 0 & 1 & 0 & -4 & 0 & 1 \end{array} \right]$$

$$-R_2 \rightarrow \left[\begin{array}{ccc|ccc} 1 & 0 & 2 & 1 & 0 & 0 \\ 0 & 1 & 1 & 2 & -1 & 0 \\ 0 & 1 & 0 & -4 & 0 & 1 \end{array} \right]$$

$$-R_2 + R_3 \rightarrow \left[\begin{array}{ccc|ccc} 1 & 0 & 2 & 1 & 0 & 0 \\ 0 & 1 & 1 & 2 & -1 & 0 \\ 0 & 0 & -1 & -6 & 1 & 1 \end{array} \right]$$

$$\begin{array}{l} R_3 + R_2 \\ 2R_3 + R_1 \end{array} \rightarrow \left[\begin{array}{ccc|ccc} 1 & 0 & 0 & -11 & 2 & 2 \\ 0 & 1 & 0 & -4 & 0 & 1 \\ 0 & 0 & -1 & -6 & 1 & 1 \end{array} \right]$$

$$-R_3 \rightarrow \left[\begin{array}{ccc|ccc} 1 & 0 & 0 & -11 & 2 & 2 \\ 0 & 1 & 0 & -4 & 0 & 1 \\ 0 & 0 & 1 & 6 & -1 & -1 \end{array} \right]$$

$$\therefore A^{-1} = \begin{bmatrix} -11 & 2 & 2 \\ -4 & 0 & 1 \\ 6 & -1 & -1 \end{bmatrix}$$