

5.  $A = \begin{bmatrix} 3 & -1 \\ 4 & 5 \end{bmatrix}$       GOAL  $\begin{bmatrix} 1 & 0 & \sim & \sim \\ 0 & 1 & \sim & \sim \end{bmatrix}$

$$\begin{bmatrix} 3 & -1 & 1 & 0 \\ 4 & 5 & 0 & 1 \end{bmatrix}$$

$$\frac{-4}{3} + 5 \quad \frac{-1}{3}$$

$$R_1 \div 3 = \text{NEW } R_1 \quad \begin{bmatrix} 1 & -\frac{1}{3} & \frac{1}{3} & 0 \\ 4 & 5 & 0 & 1 \end{bmatrix}$$

$$-4R_1 + R_2 = \text{NEW } R_2 \quad \begin{bmatrix} 1 & -\frac{1}{3} & \frac{1}{3} & 0 \\ 0 & \frac{19}{3} & -\frac{4}{3} & 1 \end{bmatrix}$$

$$3R_2 = \text{NEW } R_2 \quad \begin{bmatrix} 1 & -\frac{1}{3} & \frac{1}{3} & 0 \\ 0 & 19 & -4 & 3 \end{bmatrix}$$

$$\frac{-4}{19} \cdot \frac{1}{3} \quad \frac{3}{19} \cdot \frac{1}{3}$$

$$R_2 \div 19 = \text{NEW } R_2 \quad \begin{bmatrix} 1 & -\frac{1}{3} & \frac{1}{3} & 0 \\ 0 & 1 & -\frac{4}{19} & \frac{3}{19} \end{bmatrix}$$

$$\frac{-4}{57} + \frac{1}{3} \quad \frac{1}{19}$$

$$\frac{-4}{57} + \frac{19}{57}$$

$$\frac{15}{57}$$

$$\frac{1}{3}R_2 + R_1 = \text{NEW } R_1 \quad \begin{bmatrix} 1 & 0 & \frac{15}{57} & \frac{1}{19} \\ 0 & 1 & -\frac{4}{19} & \frac{3}{19} \end{bmatrix}$$

$$AA^{-1} = \begin{bmatrix} 3 & -1 \\ 4 & 5 \end{bmatrix} \begin{bmatrix} \frac{15}{57} & \frac{1}{19} \\ -\frac{4}{19} & \frac{3}{19} \end{bmatrix}$$

$$= \begin{bmatrix} \frac{45}{57} + \frac{4}{19} & \frac{3}{19} - \frac{3}{19} \\ \frac{60}{57} - \frac{20}{19} & \frac{12}{19} + \frac{15}{19} \end{bmatrix}$$

so  $A^{-1} = \begin{bmatrix} \frac{15}{57} & \frac{1}{19} \\ -\frac{4}{19} & \frac{3}{19} \end{bmatrix}$

$$= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad \checkmark$$

$$A = \begin{bmatrix} 3 & -1 \\ 4 & 5 \end{bmatrix}$$

$$A^{-1}A = \begin{bmatrix} \frac{15}{57} & \frac{1}{19} \\ -\frac{4}{19} & \frac{3}{19} \end{bmatrix} \begin{bmatrix} 3 & -1 \\ 4 & 5 \end{bmatrix}$$

$$= \begin{bmatrix} \frac{45}{57} + \frac{4}{19} & \frac{-15}{57} + \frac{5}{19} \\ \frac{-12}{19} + \frac{12}{19} & \frac{4}{19} + \frac{15}{19} \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad \checkmark$$