

Name \_\_\_\_\_

SHOW AS MUCH WORK AS POSSIBLE BECAUSE YOU MAY RECEIVE PARTIAL CREDIT FOR THE WORK YOU DO IF YOUR ANSWER IS INCORRECT.

$$1. \quad A = \begin{pmatrix} 4 & -7 & 3 \\ 1 & -1 & 1 \\ 4 & -5 & 4 \end{pmatrix}$$

Find  $A^{-1}$  by row-reducing  $(A|I)$  **making sure to clearly show and describe each step.**Check what you get for  $A^{-1}$  by multiplying it by  $A$ .

$$(A|I) = \left( \begin{array}{ccc|ccc} 4 & -7 & 3 & 1 & 0 & 0 \\ 1 & -1 & 1 & 0 & 1 & 0 \\ 4 & -5 & 4 & 0 & 0 & 1 \end{array} \right)$$

$$\begin{array}{l} R_2 \rightarrow \\ R_1 \rightarrow \end{array} \left( \begin{array}{ccc|ccc} 1 & -1 & 1 & 0 & 1 & 0 \\ 4 & -7 & 3 & 1 & 0 & 0 \\ 4 & -5 & 4 & 0 & 0 & 1 \end{array} \right)$$

$$\begin{array}{l} -4R_1 + R_2 \rightarrow \\ -4R_1 + R_3 \rightarrow \end{array} \left( \begin{array}{ccc|ccc} 1 & -1 & 1 & 0 & 1 & 0 \\ 0 & -3 & -1 & 1 & -4 & 0 \\ 0 & -1 & 0 & 0 & -4 & 1 \end{array} \right)$$

$$\begin{array}{l} -R_3 \rightarrow \\ -R_2 \rightarrow \end{array} \left( \begin{array}{ccc|ccc} 1 & -1 & 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 4 & -1 \\ 0 & 3 & 1 & -1 & 4 & 0 \end{array} \right)$$

$$\begin{array}{l} R_2 + R_1 \rightarrow \\ -3R_2 + R_3 \rightarrow \end{array} \left( \begin{array}{ccc|ccc} 1 & 0 & 1 & 0 & 5 & -1 \\ 0 & 1 & 0 & 0 & 4 & -1 \\ 0 & 0 & 1 & -1 & -8 & 3 \end{array} \right)$$

$$-R_3 + R_1 \rightarrow \left( \begin{array}{ccc|ccc} 1 & 0 & 0 & 1 & 13 & -4 \\ 0 & 1 & 0 & 0 & 4 & -1 \\ 0 & 0 & 1 & -1 & -8 & 3 \end{array} \right)$$

$$\boxed{A^{-1} = \begin{pmatrix} 1 & 13 & -4 \\ 0 & 4 & -1 \\ -1 & -8 & 3 \end{pmatrix}} \quad A \cdot A^{-1} = \begin{pmatrix} 4 & -7 & 3 \\ 1 & -1 & 1 \\ 4 & -5 & 4 \end{pmatrix} \begin{pmatrix} 1 & 13 & -4 \\ 0 & 4 & -1 \\ -1 & -8 & 3 \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} = I$$