

## MA 16020 Quiz 14 (Lessons 32-33)

Write your name, section number (054 for 11:30, 039 for 12:30), and quiz number on the top of your quiz, front and back.

You may use a one-line calculator.

1. Compute the matrix product

$$\begin{bmatrix} 3 & -4 & 5 \\ 2 & 0 & 8 \end{bmatrix} \cdot \begin{bmatrix} 7 & 1 \\ -2 & 3 \\ 0 & 1 \end{bmatrix}.$$

2. Find the inverse of the matrix

$$\begin{bmatrix} 3 & -9 & 11 \\ 2 & -7 & 8 \\ 2 & 0 & 4 \end{bmatrix}.$$

1.  $\begin{bmatrix} 3 & -4 & 5 \\ 2 & 0 & 8 \end{bmatrix} \cdot \begin{bmatrix} 7 & 1 \\ -2 & 3 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 3 \cdot 7 + (-4) \cdot (-2) + 5 \cdot 0 & 3 \cdot 1 + (-4) \cdot 3 + 5 \cdot 1 \\ 2 \cdot 7 + 0 \cdot (-2) + 8 \cdot 0 & 2 \cdot 1 + 0 \cdot 3 + 8 \cdot 1 \end{bmatrix} = \begin{bmatrix} 29 & -4 \\ 14 & 10 \end{bmatrix}$

2.  $\left[ \begin{array}{ccc|ccc} 3 & -9 & 11 & 1 & 0 & 0 \\ 2 & -7 & 8 & 0 & 1 & 0 \\ 2 & 0 & 4 & 0 & 0 & 1 \end{array} \right] \xrightarrow{-R_2+R_1, -R_3} \left[ \begin{array}{ccc|ccc} 1 & -2 & 3 & 1 & -1 & 0 \\ 2 & -7 & 8 & 0 & 1 & 0 \\ 2 & 0 & 4 & 0 & 0 & 1 \end{array} \right] \xrightarrow{2R_1+R_2, -2R_1+R_3} \left[ \begin{array}{ccc|ccc} 1 & -2 & 3 & 1 & -1 & 0 \\ 0 & -3 & 2 & -2 & 3 & 0 \\ 0 & 4 & -2 & -2 & 2 & 1 \end{array} \right]$

$\xrightarrow{-2R_1+R_2, -2R_1+R_3} \left[ \begin{array}{ccc|ccc} 1 & -2 & 3 & 1 & -1 & 0 \\ 0 & -3 & 2 & -2 & 3 & 0 \\ 0 & 4 & -2 & -2 & 2 & 1 \end{array} \right] \xrightarrow{R_2+R_3} \left[ \begin{array}{ccc|ccc} 1 & -2 & 3 & 1 & -1 & 0 \\ 0 & -3 & 2 & -2 & 3 & 0 \\ 0 & 1 & 0 & -4 & 5 & 1 \end{array} \right] \xrightarrow{R_2 \leftrightarrow R_3} \left[ \begin{array}{ccc|ccc} 1 & -2 & 3 & 1 & -1 & 0 \\ 0 & 1 & 0 & -4 & 5 & 1 \\ 0 & -3 & 2 & -2 & 3 & 0 \end{array} \right]$

$\xrightarrow{3R_2+R_3} \left[ \begin{array}{ccc|ccc} 1 & -2 & 3 & 1 & -1 & 0 \\ 0 & 1 & 0 & -4 & 5 & 1 \\ 0 & 0 & 2 & -14 & 8 & 3 \end{array} \right] \xrightarrow{\frac{1}{2}R_3} \left[ \begin{array}{ccc|ccc} 1 & -2 & 3 & 1 & -1 & 0 \\ 0 & 1 & 0 & -4 & 5 & 1 \\ 0 & 0 & 1 & -7 & 4 & \frac{3}{2} \end{array} \right] \xrightarrow{-3R_3+R_1} \left[ \begin{array}{ccc|ccc} 1 & -2 & 0 & 22 & -18 & -\frac{9}{2} \\ 0 & 1 & 0 & -4 & 5 & 1 \\ 0 & 0 & 1 & -7 & 4 & \frac{3}{2} \end{array} \right]$

$\xrightarrow{2R_2+R_1} \left[ \begin{array}{ccc|ccc} 1 & 0 & 0 & 14 & -18 & -\frac{5}{2} \\ 0 & 1 & 0 & -4 & 5 & 1 \\ 0 & 0 & 1 & -7 & 4 & \frac{3}{2} \end{array} \right] \rightarrow A^{-1} = \begin{bmatrix} 14 & -18 & -5/2 \\ -4 & 5 & 1 \\ -7 & 4 & 3/2 \end{bmatrix}$