

1) Suppose the matrix $\begin{bmatrix} 1 & 0 \\ 2 & 1 \end{bmatrix}$ is multiplied by another matrix, such as for instance $\begin{bmatrix} 1 & 0 \\ 2 & 1 \end{bmatrix} \cdot \begin{bmatrix} 10 & 6 \\ 5 & 8 \end{bmatrix}$.

Describe in a single sentence, phrase, or mathematical expression what occurs during this multiplication (without referencing matrix multiplication or the specific example given).

Twice the first row is added to the second row.

2) Find the inverse of the matrix below.

$$\begin{bmatrix} 2 & 4 & 0 \\ 0 & 1 & 2 \\ 0 & 1 & 3 \end{bmatrix}$$

$$\begin{aligned} & \begin{bmatrix} 2 & 4 & 0 & | & 1 & 0 & 0 \\ 0 & 1 & 2 & | & 0 & 1 & 0 \\ 0 & 1 & 3 & | & 0 & 0 & 1 \end{bmatrix} \\ \sim & \begin{bmatrix} 1 & 2 & 0 & | & 1/2 & 0 & 0 \\ 0 & 1 & 2 & | & 0 & 1 & 0 \\ 0 & 1 & 3 & | & 0 & 0 & 1 \end{bmatrix} \\ \sim & \begin{bmatrix} 1 & 2 & 0 & | & 1/2 & 0 & 0 \\ 0 & 1 & 2 & | & 0 & 1 & 0 \\ 0 & 0 & 1 & | & 0 & -1 & 1 \end{bmatrix} \\ \sim & \begin{bmatrix} 1 & 0 & -4 & | & 1/2 & -2 & 0 \\ 0 & 1 & 2 & | & 0 & 1 & 0 \\ 0 & 0 & 1 & | & 0 & -1 & 1 \end{bmatrix} \\ \sim & \begin{bmatrix} 1 & 0 & -4 & | & 1/2 & -2 & 0 \\ 0 & 1 & 0 & | & 0 & 3 & -2 \\ 0 & 0 & 1 & | & 0 & -1 & 1 \end{bmatrix} \\ \sim & \begin{bmatrix} 1 & 0 & 0 & | & 1/2 & -6 & 4 \\ 0 & 1 & 0 & | & 0 & 3 & -2 \\ 0 & 0 & 1 & | & 0 & -1 & 1 \end{bmatrix} \end{aligned}$$

$$\begin{bmatrix} 2 & 4 & 0 \\ 0 & 1 & 2 \\ 0 & 1 & 3 \end{bmatrix}^{-1} = \begin{bmatrix} 1/2 & -6 & 4 \\ 0 & 3 & -2 \\ 0 & -1 & 1 \end{bmatrix}$$