

Quiz #3

Please print your name:

Problem 1. Consider the matrix $A = \begin{bmatrix} 1 & 0 & 2 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$

- (a) Calculate A^{-1} .
- (b) Calculate $\det(A)$.

Solution. $\left[\begin{array}{ccc|ccc} 1 & 0 & 2 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 0 & 1 \end{array} \right] \xrightarrow[\begin{smallmatrix} R_3 - R_1 \Rightarrow R_3 \\ \rightsquigarrow \end{smallmatrix}]{\begin{smallmatrix} R_2 - R_1 \Rightarrow R_2 \\ R_3 - R_1 \Rightarrow R_3 \end{smallmatrix}} \left[\begin{array}{ccc|ccc} 1 & 0 & 2 & 1 & 0 & 0 \\ 0 & 1 & -2 & -1 & 1 & 0 \\ 0 & 0 & -1 & -1 & 0 & 1 \end{array} \right] \xrightarrow[-1R_3 \Rightarrow R_3]{\rightsquigarrow} \left[\begin{array}{ccc|ccc} 1 & 0 & 2 & 1 & 0 & 0 \\ 0 & 1 & -2 & -1 & 1 & 0 \\ 0 & 0 & 1 & 1 & 0 & -1 \end{array} \right]$

$\xrightarrow[\begin{smallmatrix} R_2 + 2R_3 \Rightarrow R_2 \\ \rightsquigarrow \end{smallmatrix}]{\begin{smallmatrix} R_1 - 2R_3 \Rightarrow R_1 \\ R_2 + 2R_3 \Rightarrow R_2 \end{smallmatrix}} \left[\begin{array}{ccc|ccc} 1 & 0 & 0 & -1 & 0 & 2 \\ 0 & 1 & 0 & 1 & 1 & -2 \\ 0 & 0 & 1 & 1 & 0 & -1 \end{array} \right]$

(a) $A^{-1} = \begin{bmatrix} -1 & 0 & 2 \\ 1 & 1 & -2 \\ 1 & 0 & -1 \end{bmatrix}$

(b) $\det(A) = \det\left(\begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & -2 \\ 0 & 0 & -1 \end{bmatrix}\right) = -1$

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