

Problem 1. Compute the inverse of the matrix

$$\begin{pmatrix} 1 & 0 & -1 \\ 2 & 1 & -3 \\ 1 & -2 & 3 \end{pmatrix}$$

$$\left(\begin{array}{ccc|ccc} 1 & 0 & -1 & 1 & 0 & 0 \\ 2 & 1 & -3 & 0 & 1 & 0 \\ 1 & -2 & 3 & 0 & 0 & 1 \end{array} \right)$$

$$\left(\begin{array}{ccc|ccc} 1 & 0 & -1 & 1 & 0 & 0 \\ 0 & 1 & -1 & -2 & 1 & 0 \\ 0 & -2 & 4 & -1 & 0 & 1 \end{array} \right)$$

$$\left(\begin{array}{ccc|ccc} 1 & 0 & -1 & 1 & 0 & 0 \\ 0 & 1 & -1 & -2 & 1 & 0 \\ 0 & 0 & 2 & -5 & 2 & 1 \end{array} \right)$$

$$\left(\begin{array}{ccc|ccc} 1 & 0 & -1 & 1 & 0 & 0 \\ 0 & 1 & -1 & -2 & 1 & 0 \\ 0 & 0 & 1 & -5/2 & 1 & 1/2 \end{array} \right)$$

$$\left(\begin{array}{ccc|ccc} 1 & 0 & 0 & -3/2 & 1 & 1/2 \\ 0 & 1 & 0 & -9/2 & 2 & 1/2 \\ 0 & 0 & 1 & -5/2 & 1 & 1/2 \end{array} \right)$$

Therefore the inverse of the original matrix is

$$\begin{pmatrix} -3/2 & 1 & 1/2 \\ -9/2 & 2 & 1/2 \\ -5/2 & 1 & 1/2 \end{pmatrix}$$