

Question #16133 find the inverse to the matrix $M = \begin{pmatrix} 2 & -3 \\ 4 & -5 \end{pmatrix}$ and use this inverse to solve the system of equations $2x - 3y = 7, 4x - 5y = 15$

Solution. We find the the inverse matrix with the help of adjugate matrix. For matrix $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ the inverse is $A^{-1} = 1/\det A \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$, so $M^{-1} = \frac{1}{2} \begin{pmatrix} -5 & -4 \\ 3 & 2 \end{pmatrix}$, hence the solution is $\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{2} \begin{pmatrix} -5 & -4 \\ 3 & 2 \end{pmatrix} \cdot \begin{pmatrix} 7 \\ 15 \end{pmatrix} = \begin{pmatrix} -95/2 \\ 51/2 \end{pmatrix}$