

Use Cramer's Rule to find the solutions to the system  $\begin{cases} 3x_1 - x_2 = -10 \\ -2x_1 + 5x_2 = -2 \end{cases}$ .

### An algorithm for finding inverse matrices

The matrix of cofactors of a square matrix  $A$  is the matrix that results from replacing each of its entries by their corresponding cofactors.

**The Adjoint (Adjugate) of  $A$**  is the transpose of  $A$ 's matrix of cofactors.

The inverse of a nonsingular square matrix  $A$  is  $A^{-1} = \frac{1}{\det(A)} \text{Adj}(A)$ .

Please note that this implies that the matrix  $A$  is nonsingular if and only if  $\det(A) \neq 0$ . This also implies, albeit less directly, that the square system  $A\mathbf{x} = \mathbf{b}$  has a unique solution if and only if  $\det(A) \neq 0$ .

Let's use the determinant and adjoint to find  $A^{-1}$  where  $A = \begin{bmatrix} 1 & 2 & -1 \\ 2 & 2 & 4 \\ 1 & 3 & -3 \end{bmatrix}$ .