Gauss-Jordan Elim. for Finding A^{-1}

Given invertible $A_{n \times n}$

So A^{-1} exists and we want to find it

$$AA^{-1} = I$$

can be viewed as n systems of equations:

$$\begin{cases} A(A^{-1})_{:,1} = e_1 \\ A(A^{-1})_{:,2} = e_2 \\ \vdots \\ A(A^{-1})_{:,n} = e_n \end{cases}$$

Perform GJ elimination on A, tagging I along

$$[\, A \mid I \,]$$

Afterwards, we get (A^{-1} is here!)

$$E[\, A \mid I \,] = [\, I \mid E \,]$$

E: elim. matrix for GJ

since $EA = I$, $E = A^{-1}$,