sept 10^{th} 2024

Ex 1

Check the formula for the 2×2 inverse.

$$\begin{pmatrix} d & -b \\ -c & a \end{pmatrix} \cdot \begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} da-bc, & db-bd \\ 0, & -bc+ad \end{pmatrix} = (ad-bc)\begin{bmatrix} 1 & 0 \\ c & 1 \end{bmatrix}$$

Ex 2

Is $A = \begin{pmatrix} 1 & 0 & 0 \\ 2 & 0 & 1 \\ 1 & -1 & 2 \end{pmatrix}$ invertible? If it is compute A^{-1}.

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

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

A^{-1} exists

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

Ex 3

Is $A = \begin{pmatrix} 1 & 0 \\ 2 & 2 \end{pmatrix}$ invertible? If it is compute A^{-1}.

yes !! :)

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix}^{-1} = \frac{1}{ad-bc}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 \\ 2 & 2 \end{pmatrix}^{-1} = \frac{1}{(1)(2)-(0)(0)}\begin{pmatrix} 2 & -0 \\ -2 & 1 \end{pmatrix} = \frac{1}{2}\begin{pmatrix} 2 & 0 \\ -2 & 1 \end{pmatrix}$$

Ex4/ Is $\begin{pmatrix} 1 & 2 \\ 1 & 2 \end{pmatrix}$ invertible?

det = 0 so <u>not</u> invertible!