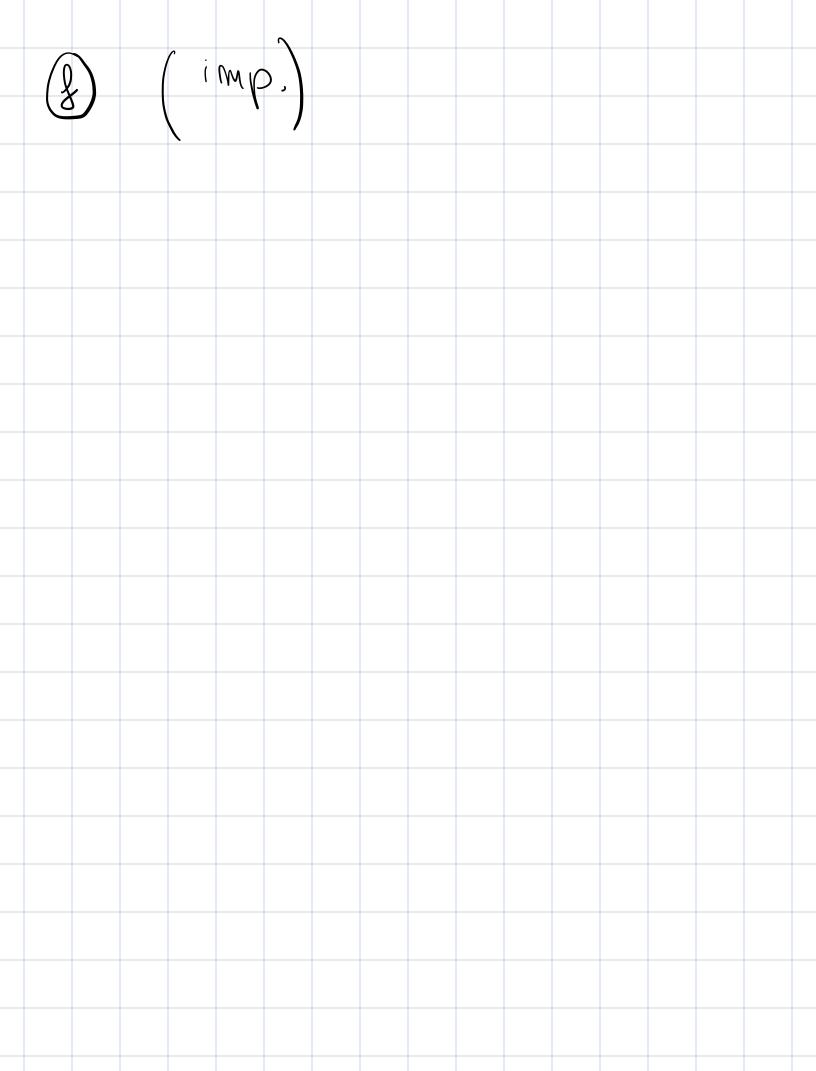
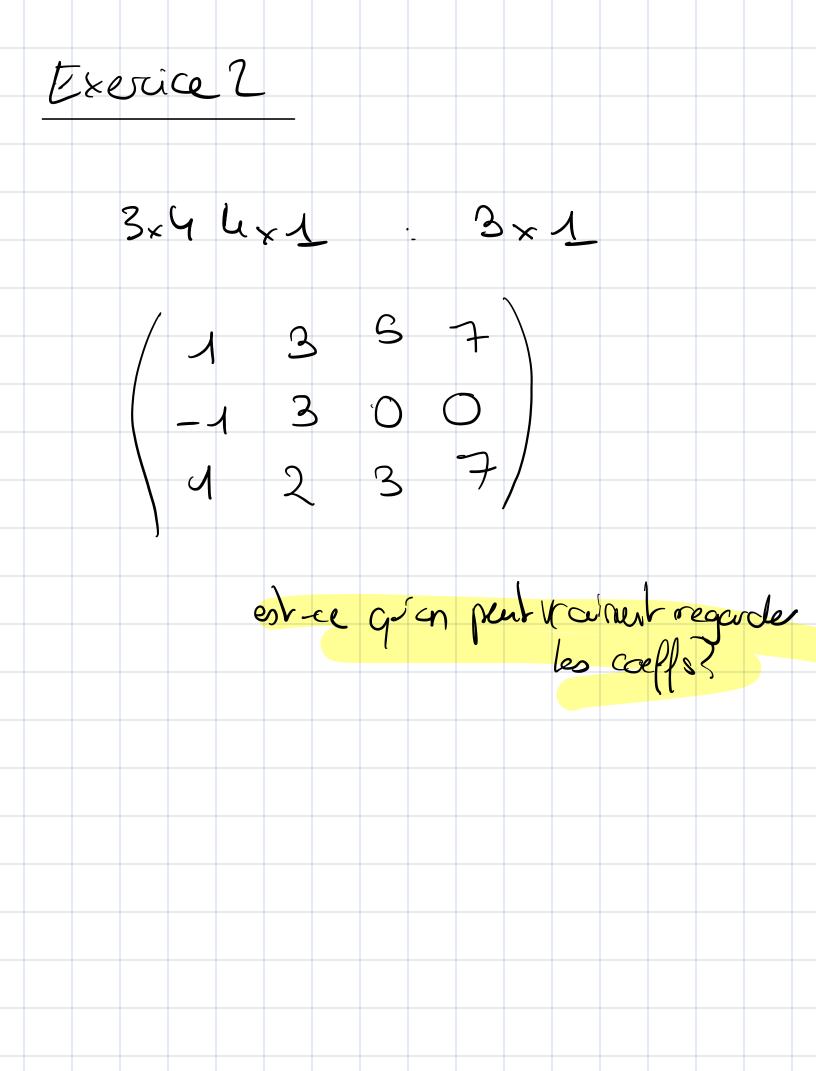
3×2 2×1 Exercice 1 $\begin{pmatrix}
0 & 0 & 1 \\
0 & 0 & 0 \\
1 & 0 & 0
\end{pmatrix}$ bijeche





$$\begin{pmatrix}
1 & 3 & 5 & 7 & 1 & 0 \\
-1 & 3 & 0 & 0 & 1 & 6 \\
4 & 2 & 3 & 7 & 7 & 0
\end{pmatrix}$$

$$\begin{pmatrix}
0 & 6 & 5 & 7 & 1 & 0 \\
0 & 5 & 0 & 0 & 1 & 6 \\
1 & 2 & 3 & 7 & 1 & 0
\end{pmatrix}$$

$$\begin{pmatrix}
1 & 0 & 3 & 7 & 1 & 6 \\
0 & 0 & 5 & 7 & 1 & 0 \\
0 & 1 & 0 & 0 & 0
\end{pmatrix}$$

$$\begin{pmatrix}
1 & 0 & -2 & 0 & 1 & 6 \\
0 & 0 & 5 & 7 & 1 & 0 \\
0 & 1 & 0 & 0 & 0
\end{pmatrix}$$

$$\begin{pmatrix}
1 & 0 & -2 & 0 & 1 & 6 \\
0 & 0 & 0 & 7 & 1 & 6 \\
0 & 1 & 0 & 0 & 0
\end{pmatrix}$$

$$\begin{pmatrix}
1 & 0 & -2 & 0 & 1 & 6 \\
0 & 0 & 0 & 1 & 7 & 1 & 6 \\
0 & 1 & 0 & 0 & 0 & 0
\end{pmatrix}$$

$$\begin{pmatrix}
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0 & 0 & 0 & 1 & 7 & 1 & 6 \\
0 & 1 & 0 & 0 & 0 & 0
\end{pmatrix}$$

$$\begin{pmatrix}
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0 & 0 & 0 & 1 & 7 & 1 & 6 \\
0 & 1 & 0 & 0 & 0 & 0
\end{pmatrix}$$

$$\begin{pmatrix}
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0 & 0 & 0 & 1 & 7 & 1 & 6 \\
0 & 1 & 0 & 0 & 0 & 0
\end{pmatrix}$$

$$\begin{pmatrix}
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0 & 0 & 0 & 1 & 7 & 1 & 6 \\
0 & 0 & 0 & 0 & 0 & 0
\end{pmatrix}$$

$$\begin{pmatrix}
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0 & 0 & 0 & 1 & 7 & 1 & 6 \\
0 & 0 & 0 & 0 & 0 & 0
\end{pmatrix}$$

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0 & 0 & 0 & 0 & 0
\end{pmatrix}$$

$$\begin{pmatrix}
1 & 0 & 0 & 0 & 1 & 6 \\
0 & 0 & 0 & 0 & 0
\end{pmatrix}$$

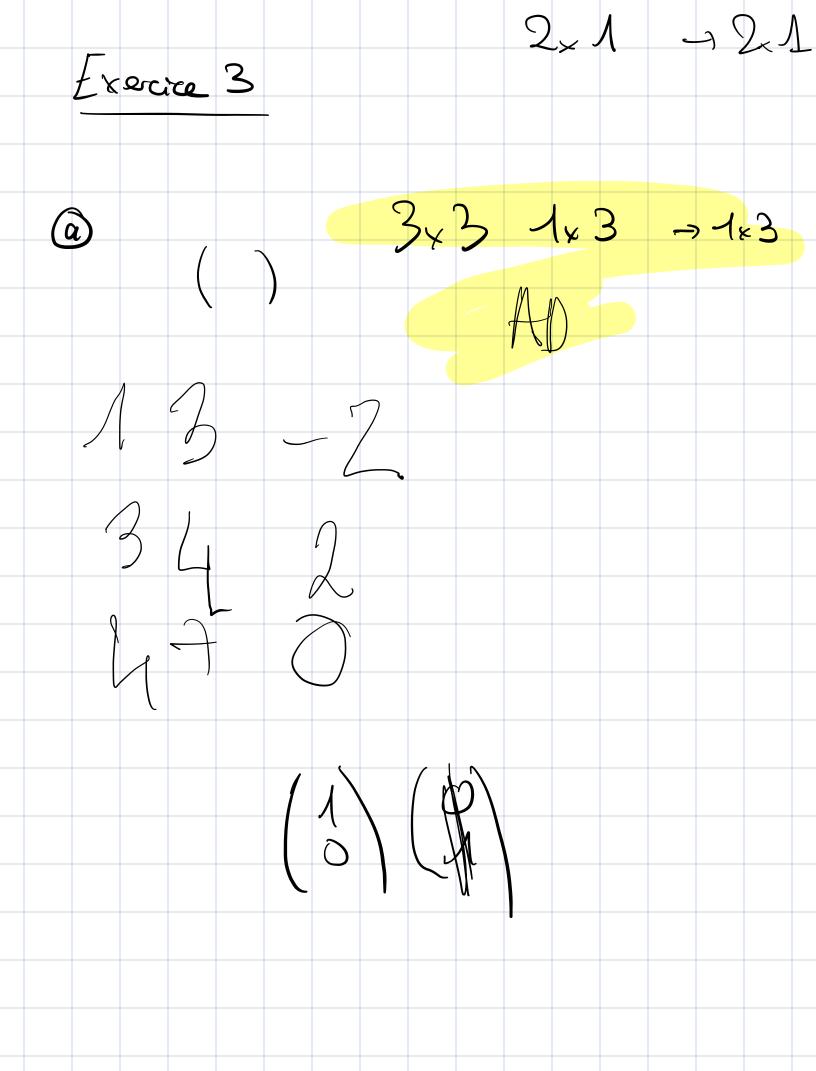
$$\begin{pmatrix}
1 & 0 & 0 & 0 & 1 & 6 \\
0 & 0 & 0 & 0 & 0
\end{pmatrix}$$

$$\begin{pmatrix}
1 & 0 & 0 & 0 & 1 & 6 \\
0 & 0 & 0 & 0 & 1 & 6 \\
0 & 0 & 0 & 0 & 0
\end{pmatrix}$$

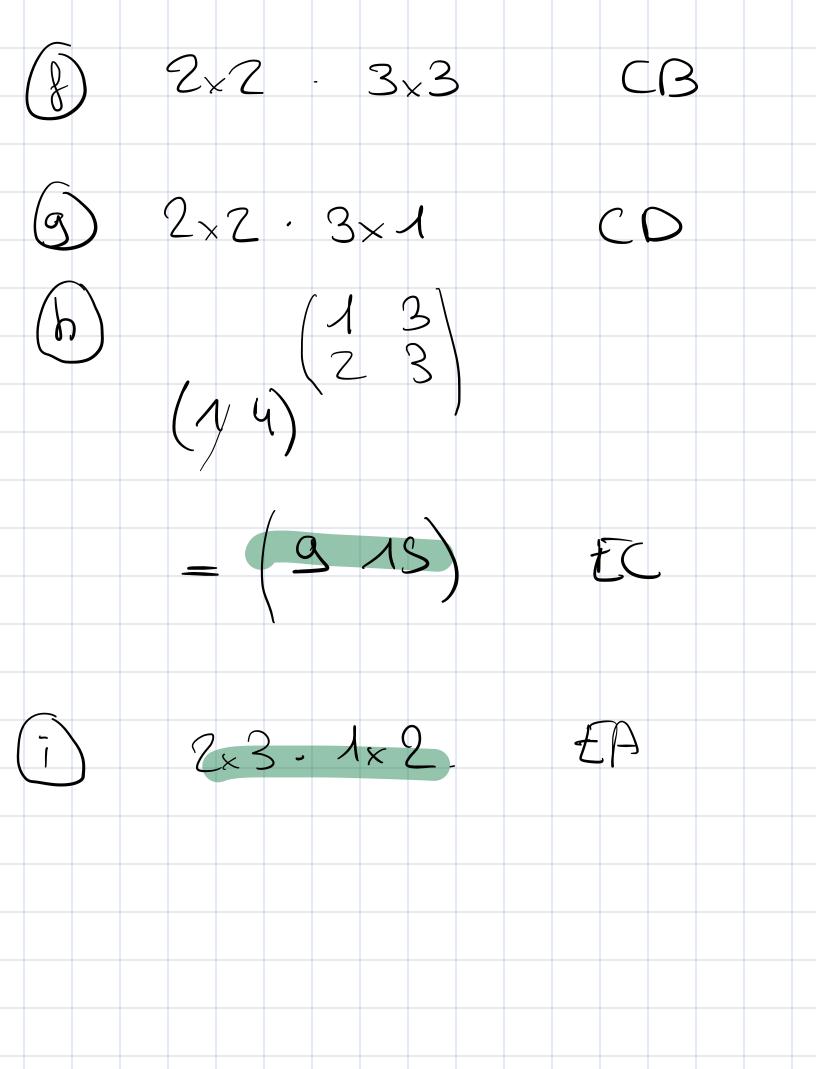
$$\begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 1 & 6 \\
0 & 0 & 0 & 0 & 0
\end{pmatrix}$$

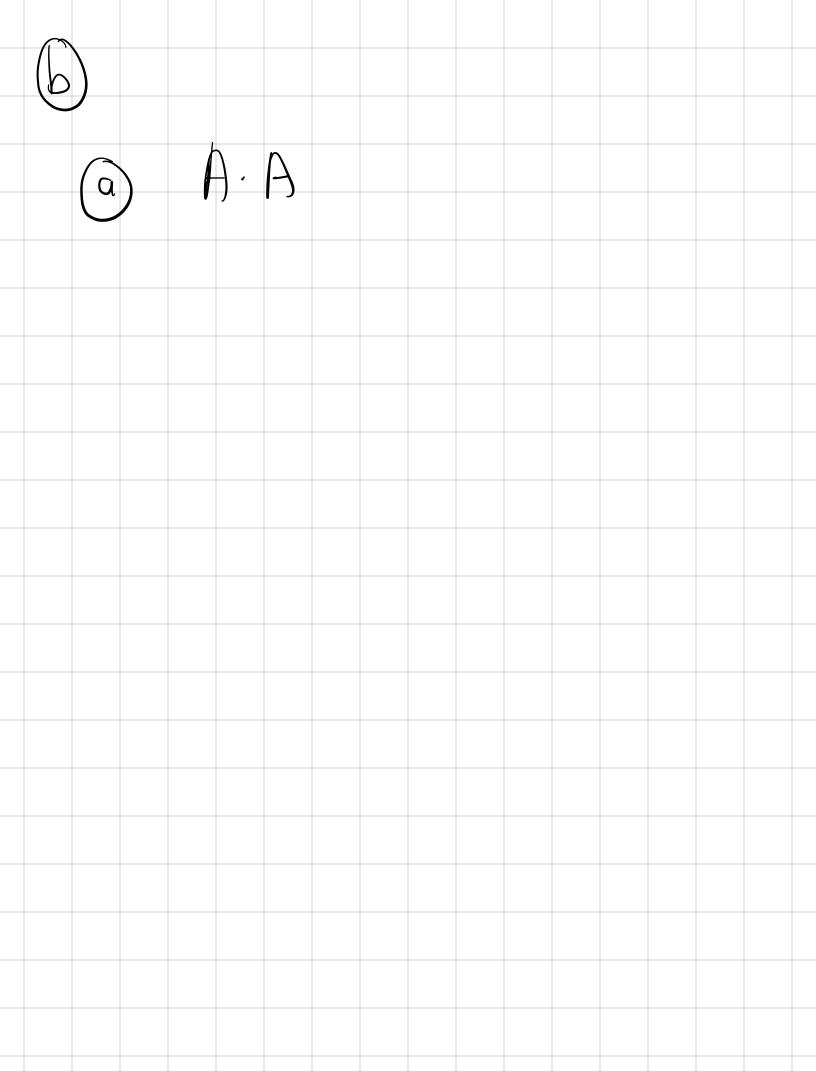
$$\begin{pmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 1 & 6 \\
0 &$$

= E 2 75 donc pas injective Les colones de A ergendrent 123 (un proor par ligne) => empedre



Exercice 4 (3 1) 2 2 1 4 (211)





Exercice S

(a)
$$Soil A = \begin{pmatrix} J & O \\ O & J \end{pmatrix}$$

$$AB = \begin{pmatrix} 1 + 6 \\ 0 + 1 \\ 0 + 1 \end{pmatrix}$$

$$B = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$$

$$B = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$$

$$= \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$$

$$= \begin{pmatrix} 1 & 0 \\ 1 & 0 \end{pmatrix}$$

$$= \begin{pmatrix} 1 & 0 \\ 1 & 0 \end{pmatrix}$$

$$= \begin{pmatrix} 1 & 0 \\ 1 & 0 \end{pmatrix}$$

t intelligent que son? (32)(ab) (36)(cd)

$$= (3a + 2c b + 2d)$$

$$= (3a + 6c 3b + 6d)$$

Méthode Z

$$A = \begin{pmatrix} a & b \\ c & d \end{pmatrix} \quad B = \begin{pmatrix} x_1 & x_3 \\ x_1 & x_4 \end{pmatrix}$$

$$B = \begin{pmatrix} x_1 & x_3 \\ x_1 & x_4 \end{pmatrix}$$

$$AB = \begin{pmatrix} x_{1}a + x_{2}b & x_{3}a + x_{4}b \\ x_{1}c + x_{2}d & x_{3}c + x_{4}a \end{pmatrix}$$

$$= \begin{pmatrix} Ab_{1} & Ab_{2} \\ Ab_{2} & Ab_{3} \end{pmatrix}$$

$$= \begin{pmatrix} x_{1}a + x_{2}b \\ x_{1}c + x_{2}d \end{pmatrix}$$

$$= \begin{pmatrix} Ab_{1} & Ab_{2} \\ Ab_{2} & Ab_{3}b \end{pmatrix}$$

$$= \begin{pmatrix} Ab_{1} & Ab_{2} \\ Ab_{2} & Ab_{3}b \end{pmatrix}$$

$$= \begin{pmatrix} Ab_{1} & Ab_{2} \\ Ab_{2} & Ab_{3}b \end{pmatrix}$$

$$= \begin{pmatrix} Ab_{1} & Ab_{2} \\ Ab_{2} & Ab_{3}b \end{pmatrix}$$

$$a + b = 0$$
 $a = -b$
 $a = -b$
 $b = 0$
 $a = -b$
 a

$$(3-4)(7-4)$$

$$(-S 1)(Sk)$$

$$(3)$$

$$= \begin{pmatrix} 21 - 20 & 12 - 4k \\ -35 + 5 & -20 + k \end{pmatrix}$$

$$(34)(3-4)$$

$$= \begin{pmatrix} 21 - 20 & -28 + 4 \\ 15 - 5k & -20 + k \end{pmatrix}$$

$$\int 18 - 5k = -30$$

 $1 - 24 = 12 - 4k$

$$\begin{cases} k=3, \\ k=3. \end{cases}$$

$$\begin{pmatrix} a & b \end{pmatrix} \begin{pmatrix} a & b \end{pmatrix}$$

$$= \begin{pmatrix} a^2 + cb & ba + db \\ ac + cd & bc + d^2 \end{pmatrix}$$

$$a^{2} + cb = 0$$

$$ba + db = 0$$

$$ac + cd = 0$$

$$bc + d^{2} = 0$$

Exorcice 7

$$T(3) = (3)$$

$$T \left(\begin{array}{c} 0 \\ 1 \end{array} \right) = \left(\begin{array}{c} 0 \\ 1 \end{array} \right)$$

$$A_{\lambda} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \\ 1 & 0 \end{pmatrix}$$

$$\begin{pmatrix}
b \\
7 \\
0
\end{pmatrix} = 1$$

 $T\left(\begin{array}{c} O\\O\\O\end{array}\right) = 1$

$$T\begin{pmatrix} 0\\1\\0 \end{pmatrix} = 1$$

$$A_2 = (1,1,1)$$

$$T_2 \circ T_1$$

$$A_2 A_1 \left(\begin{array}{c} 1 & 0 \\ 9 & 1 \end{array} \right)$$

$$(1,1,1)$$

$$= (2,1)$$

$$D \cap R^2 \operatorname{dep} \cdot R \text{ arrive}$$

Prover (AB) = BTAT (ExS)

A de taille mxn B de taille nxp

AB compatible de taille mxp.

(es)

(ii) = Aii

(ab)

(cd) $A^{T}_{ij} = A_{ji}$

= (ea+gb -- ec+gd -- $B^{T}ij = Bji$

ABij = Si Aik · Bkj

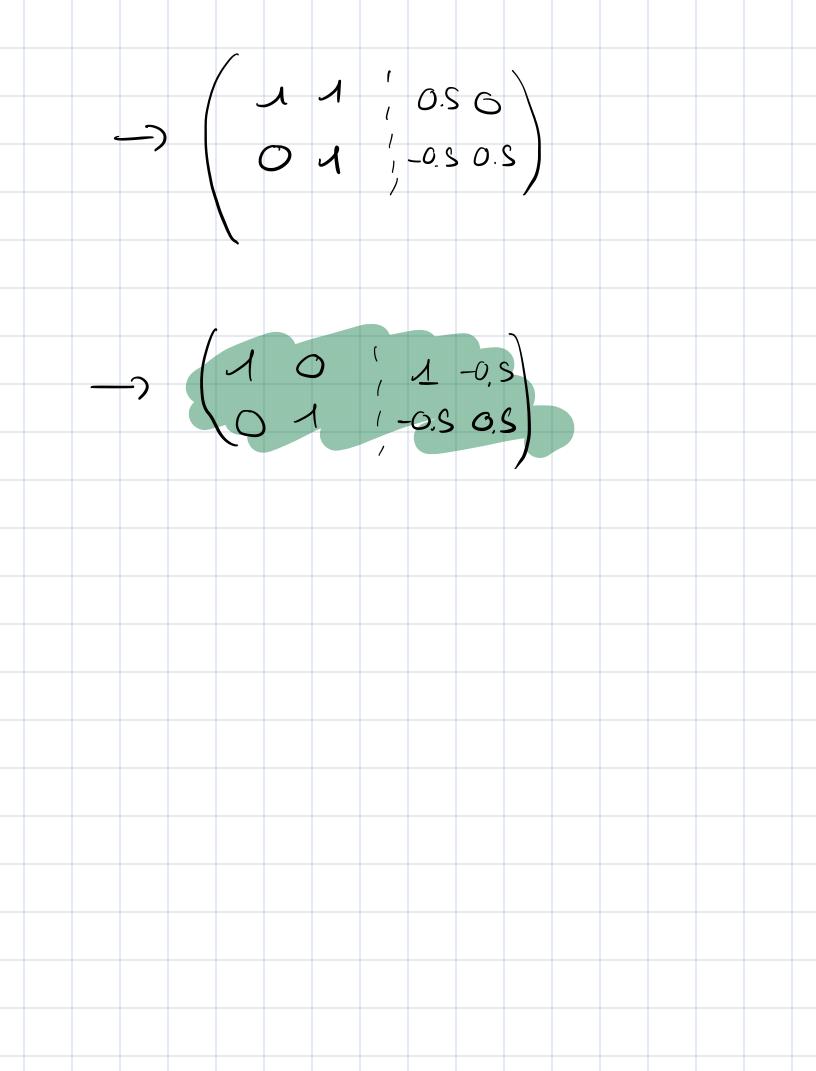
 $AB_{ij} = AB_{i} = S_{k=0}$ Ajk Bki

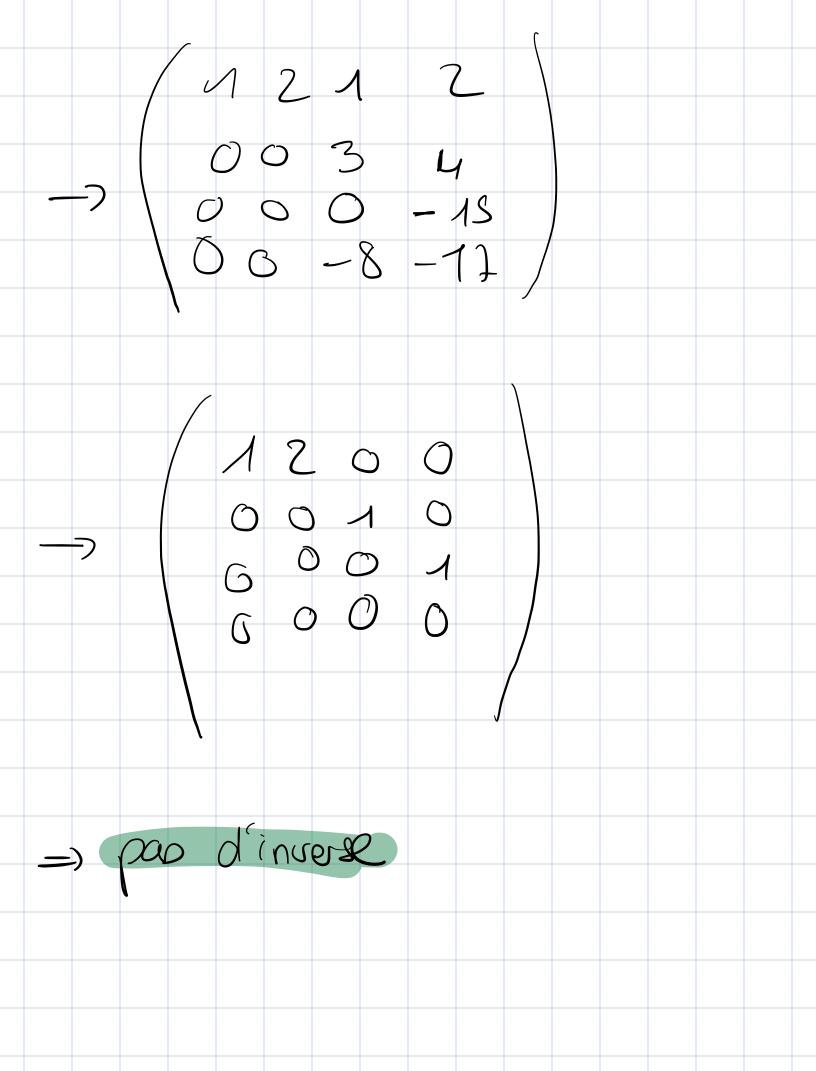
 $= \sum_{k=0}^{n} A^{T}_{kj} \cdot B^{T}_{ik}$ $= \sum_{K=0}^{n} B^{T}_{ik} \cdot A^{T}_{kj}$

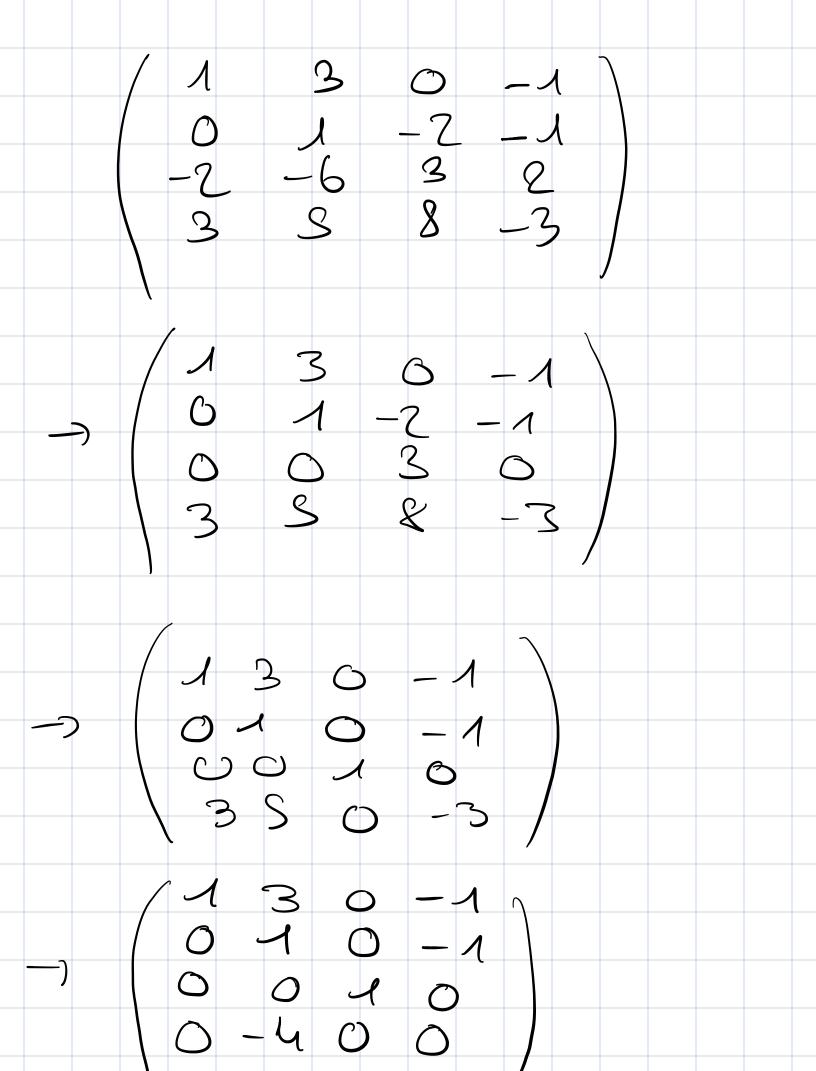
= $B^T \cdot A^T$

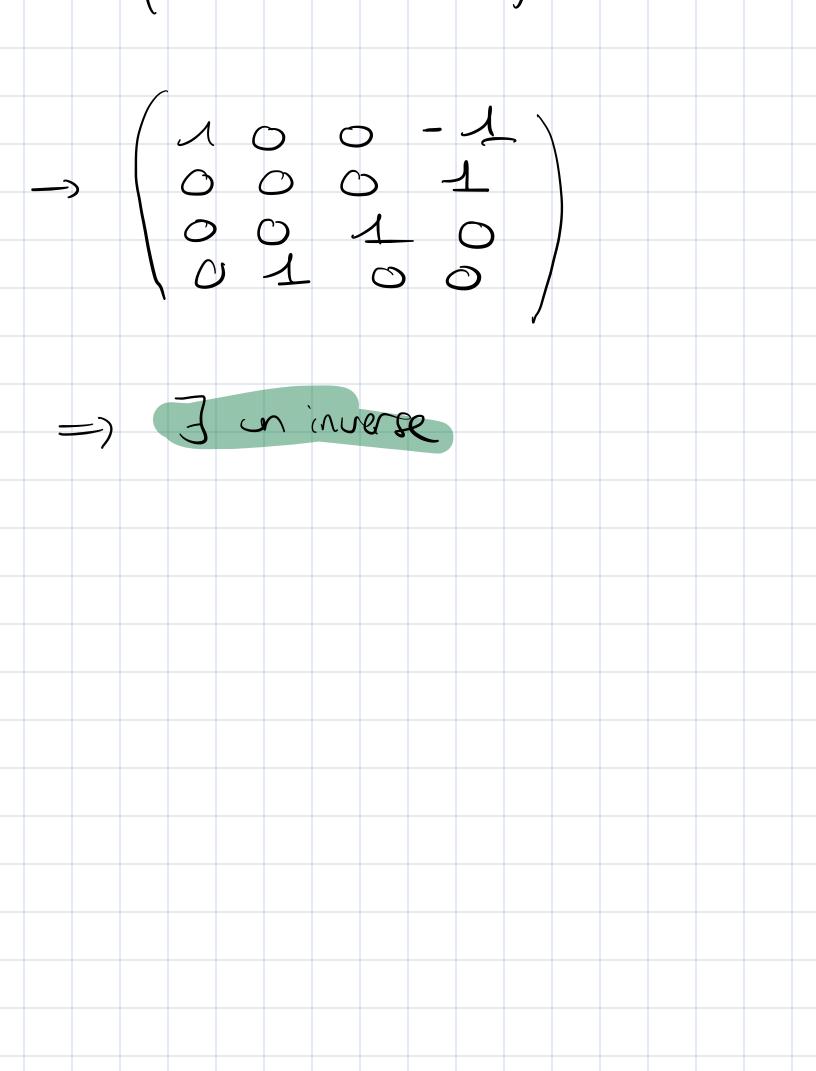
$$A^{-1} = \frac{1}{4} \begin{pmatrix} 4 - 2 \\ -2 2 \end{pmatrix}$$

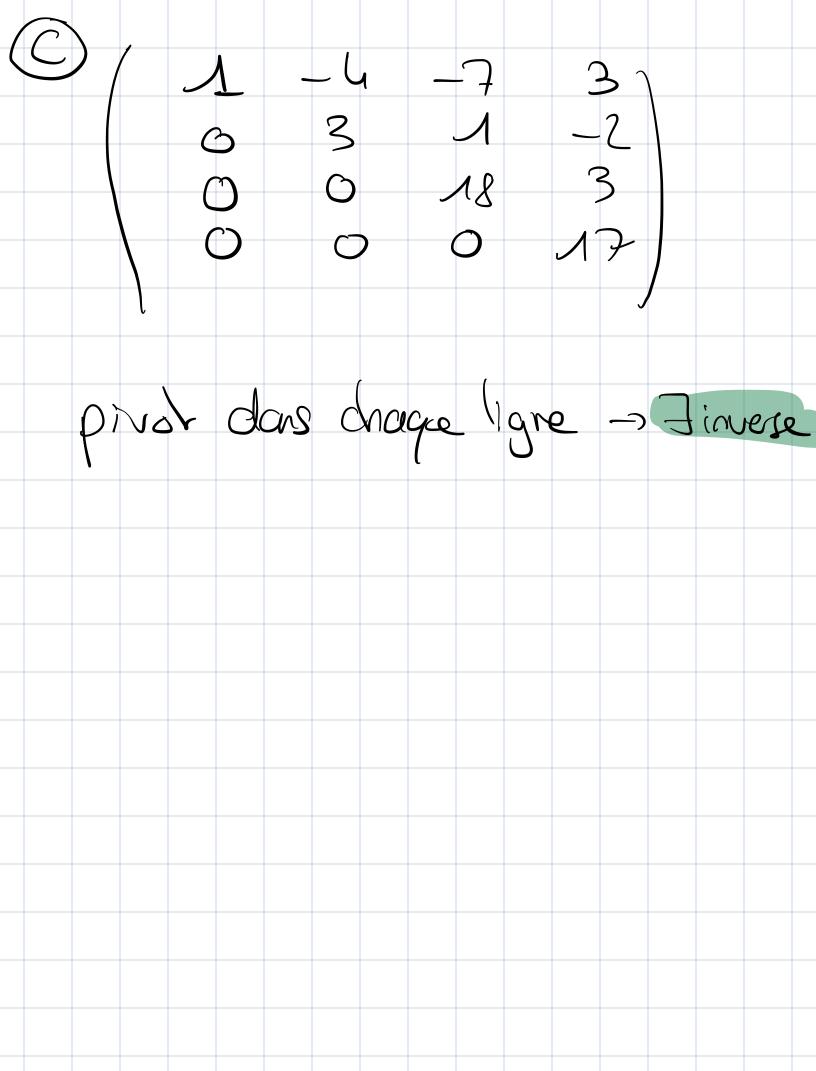
$$\rightarrow \begin{pmatrix} 11 & 1080 \\ 12 & 100.5 \end{pmatrix}$$

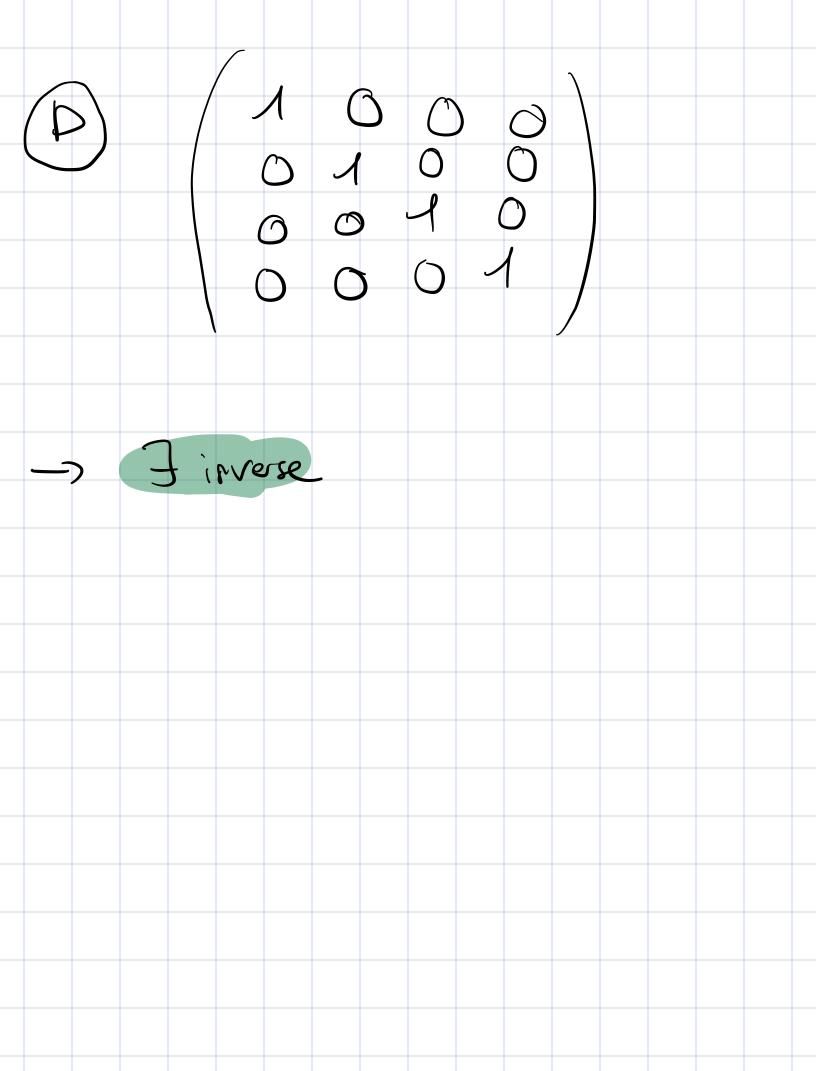


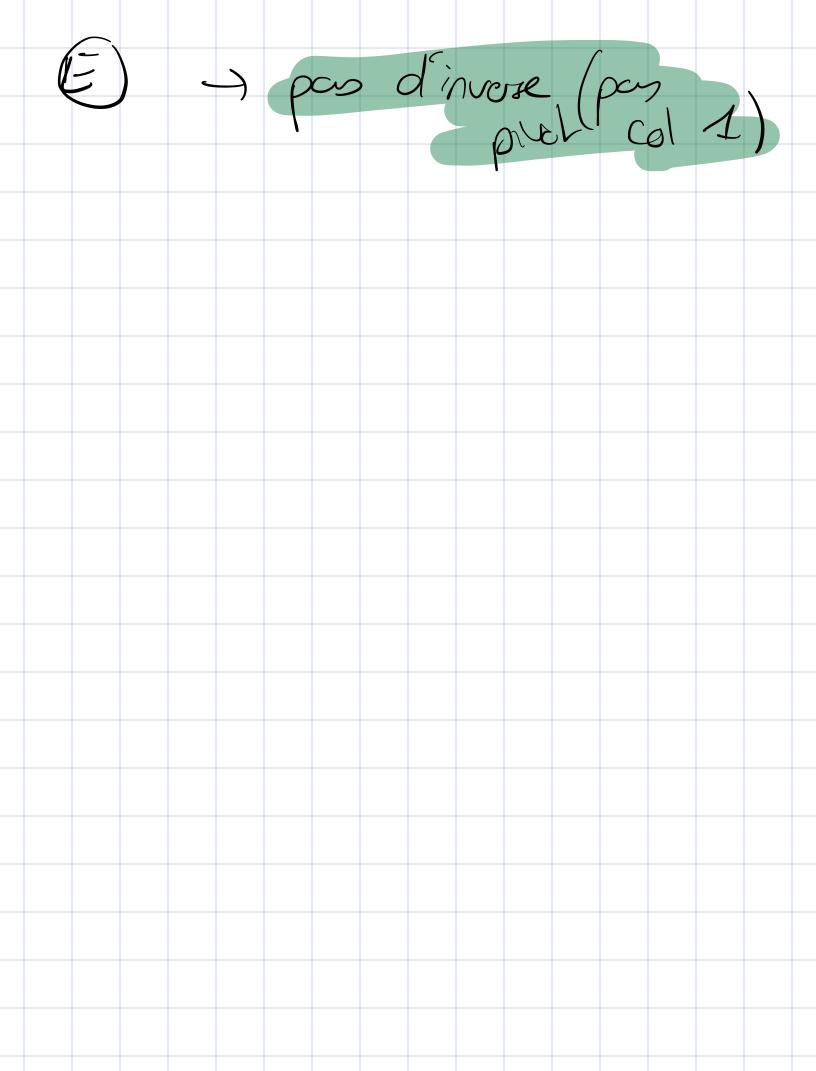












$$(AD)_{ij} = \sum_{k=1}^{n} A_{ik} \cdot D_{kj}$$

$$(AB)_{i,j} = \sum_{k=1}^{i,j} A_{i,k} \cdot B_{k,j}$$

or
$$(AB + AC)_{ij}$$

$$= \sum_{k=1}^{\infty} A_{ik} \cdot B_{kj}$$

$$+ \sum_{k=1}^{\infty} A_{ik} \cdot (E_{k})$$

$$= \sum_{k=1}^{\infty} A_{ik} \cdot (E_{k-1}) \cdot B_{kj}$$

$$= \sum_{k=1}^{\infty} A_{ik} \cdot D_{kj}$$

$$= AD_{ij}$$

Par designation:

$$I_{mij} = \begin{cases} O & Si & \neq j \\ A & Si & = j \end{cases}$$

$$et & (I_m A)_{ij} = \begin{cases} O & Si & k = j \\ k & A & A & A & A & A \end{cases}$$

$$= A_{ij} \quad A_{ik} \cdot I_{kj}$$

S, A E 112^{nx} est inweible,

JI ZER" K.q

 $A\widehat{x} = \overline{b}$.

=> bijedrité => un phot par ligne

-> indépendence linéaire

=> ergendre IR?.

$$C = \begin{pmatrix} 0 & 3 & 4 \\ 0 & 5 & 5 \\ 0 & 0 & 5 \end{pmatrix}$$

$$= \begin{pmatrix} 0 & 0 & 15 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

$$\begin{pmatrix}
0 & 0 & 15 \\
0 & 0 & 0
\end{pmatrix}
\begin{pmatrix}
0 & 3 & 4 \\
0 & 0 & 0
\end{pmatrix}$$

$$= \begin{pmatrix}
0 & 0 & 0 \\
0 & 0 & 0
\end{pmatrix}$$

$$= \begin{pmatrix}
0 & 0 & 0 \\
0 & 0 & 0
\end{pmatrix}$$

$$\begin{pmatrix}
3 & 4 & 4 & 4 & 4
\end{pmatrix}$$

$$\begin{bmatrix}
13 & 4 & 4 & 4 & 4
\end{bmatrix}$$

$$= \begin{bmatrix}
13 & -13 & 4 & 4 & 4
\end{bmatrix}$$

$$= \begin{bmatrix}
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$$= \begin{bmatrix}
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$$= \begin{bmatrix}
13 & -13 & 4 & 4
\end{bmatrix}$$

$$\begin{array}{c}
3 \\
0 \\
0 \\
0 \\
0
\end{array}$$

$$\begin{array}{c}
3 \\
0 \\
0 \\
0
\end{array}$$

$$\begin{array}{c}
4 \\
0 \\
0 \\
0
\end{array}$$

$$\begin{array}{c}
4 \\
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$$\begin{array}{c}
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$$\begin{array}{c}
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$$\begin{array}{c}
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$$\begin{array}{c}
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$$\begin{array}{c}
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\end{array}$$

$$\begin{array}{c}
4 \\
0 \\
0 \\
0
\end{array}$$

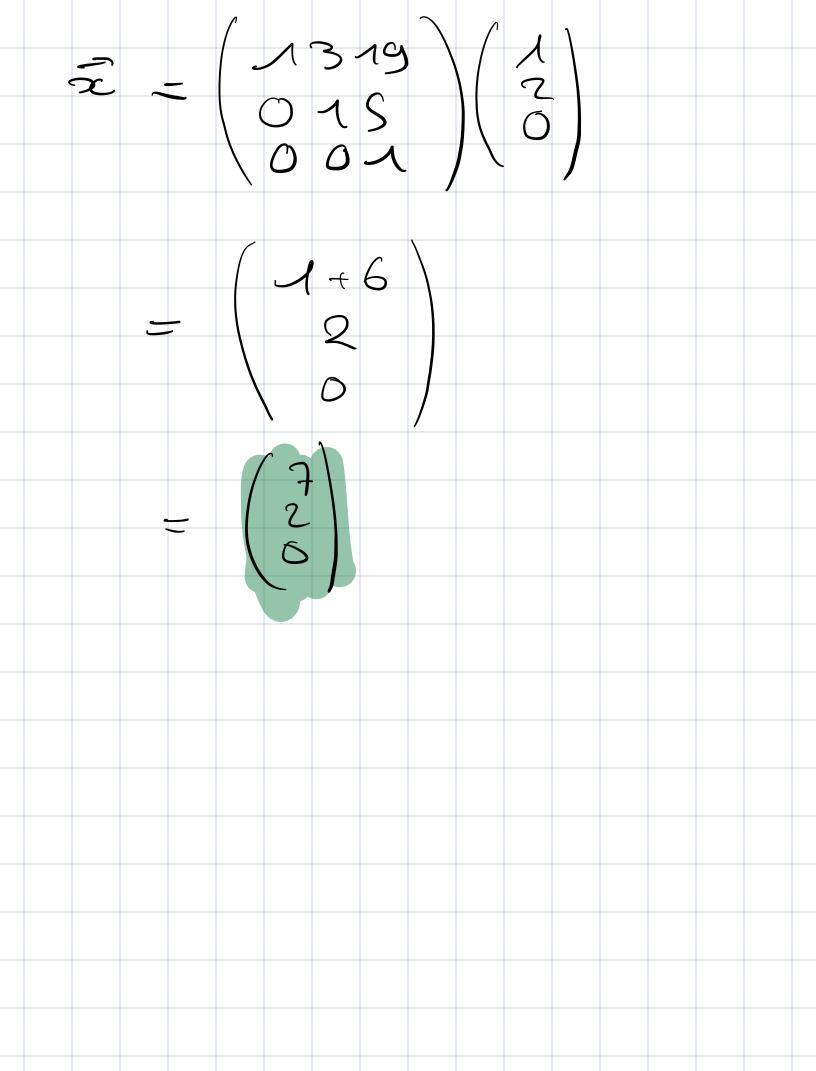
$$\begin{array}{c}
4 \\
0 \\
0 \\
0
\end{array}$$

$$\begin{array}{c}
4 \\
0 \\
0 \\
0
\end{array}$$

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

$$= \begin{pmatrix} 1 & 0 & 0 & 7 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 0 \end{pmatrix}$$

$$= \begin{pmatrix} 1 & 0 & 0 & 7 \\ 0 & 0 & 1 & 0 \\ \hline
1 & - & - & - & - \\ \hline
2 & - & - & - & - & - \\ \hline
3 & - & - & - & - & - \\ \hline
1 & - & - & - & - & - \\ \hline
2 & - & - & - & - & - \\ \hline
3 & - & - & - & - & - \\ \hline
4 & - & - & - & - & - \\ \hline
3 & - & - & - & - & - \\ \hline
4 & - & - & - & - & - \\ \hline
5 & - & - & - & - & - \\ \hline
6 & - & - & - & - & - \\ \hline
7 & - & - & - & - & - \\ \hline
1 & - & - & - & - & - \\ \hline
2 & - & - & - & - & - \\ \hline
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6 & - & - & - & - \\ \hline
7 & - & - & - & - \\ \hline
9 & - & - & - & - \\ \hline
1 & - & - & - & - \\ \hline
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$$\frac{3}{4} + \frac{1}{4} = \frac{3}{4}$$

$$\begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix} \begin{pmatrix} 1 \\ 2 \end{pmatrix}$$

