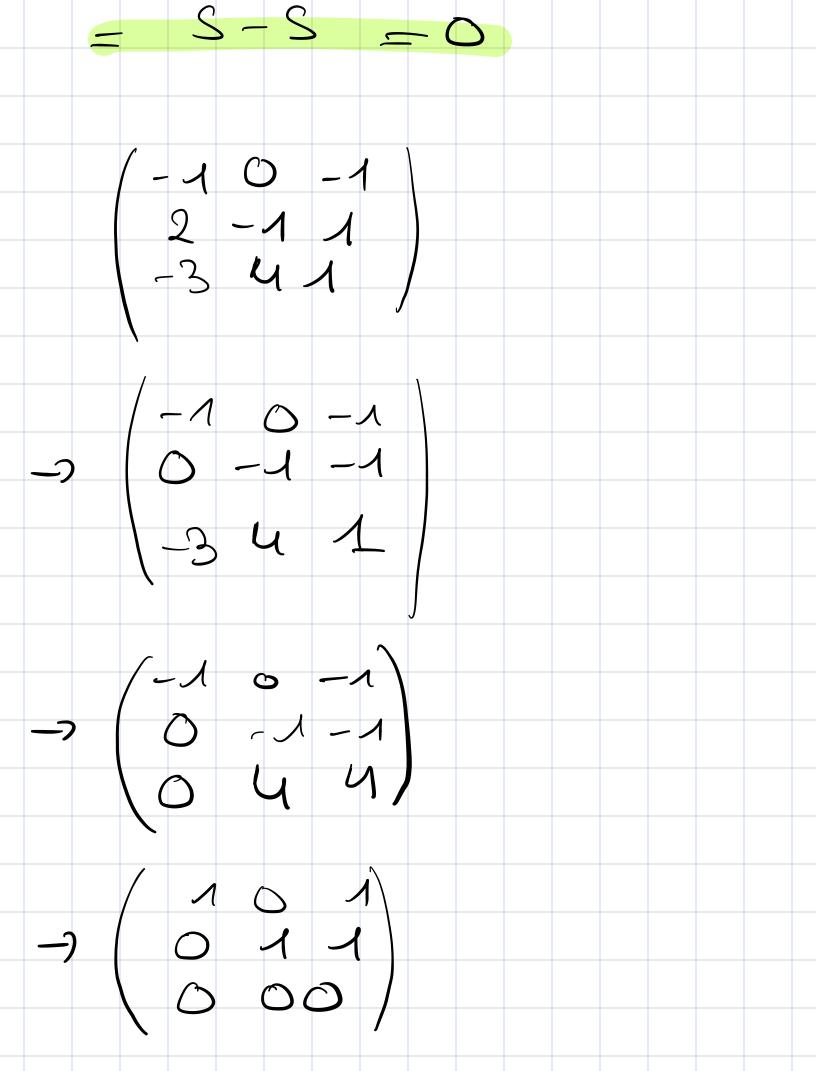
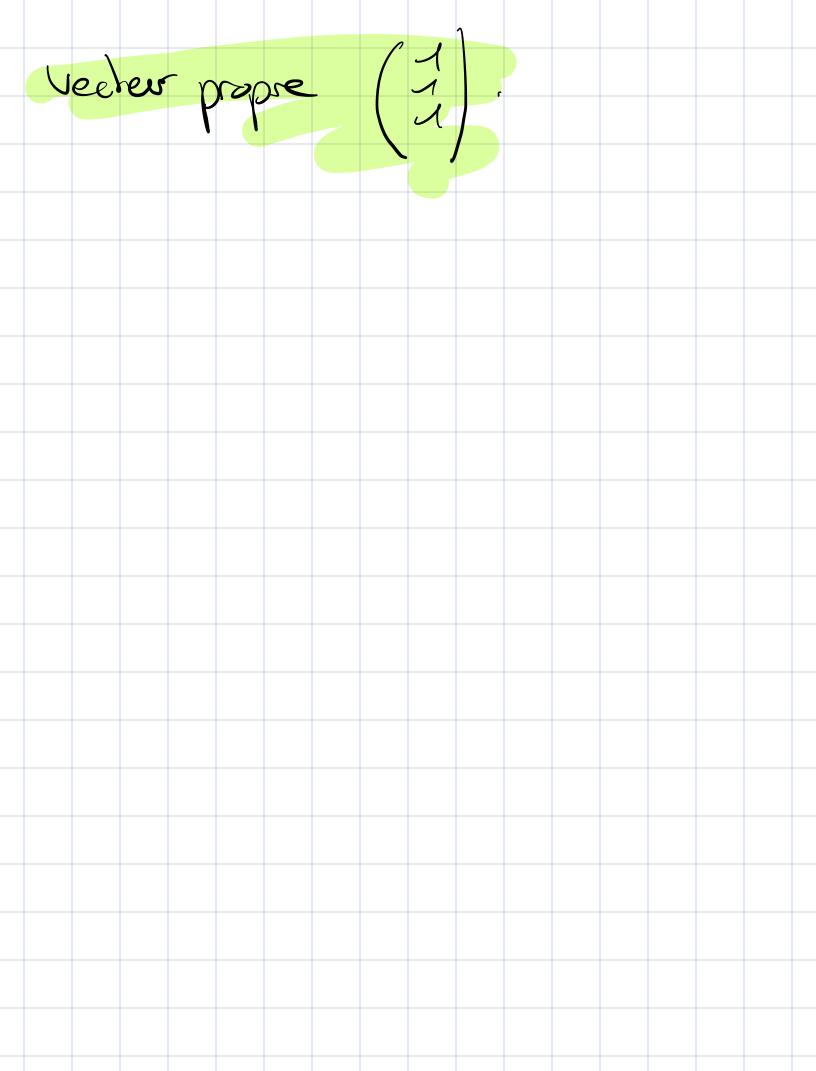
(a)

$$A - \lambda I$$

$$= \begin{pmatrix} -1 & 0 & -1 \\ 2 & -1 & 1 \\ -3 & 4 & 1 \end{pmatrix}$$

$$= -1 \cdot ((-1) \cdot 1 - 4 \cdot 1)$$





$$A\overline{x} = \lambda \overline{z}$$

$$= \begin{pmatrix} 12 - 21 + 9 \\ -16 + 18 + 1 \\ 8 - 12 + 4 \end{pmatrix}$$

$$\lambda = 0$$
 c(es) $O(x)$

Exercice 2 the matrice Par est diagonalisable 8' PAPT = D 8) elle a n vedeurs propres -1 => 2 veets • $\lambda = 1 \omega \lambda =$ diagnalisable

$$= (3-\lambda)(2-\lambda)-2$$

$$= 6 - 3\lambda - 2\lambda + \lambda^2 - 2$$

$$=$$
 $\lambda^2 - S\lambda + 4$

$$\lambda_1 = \Delta \quad \text{as} \quad \lambda_2 \neq \Lambda$$

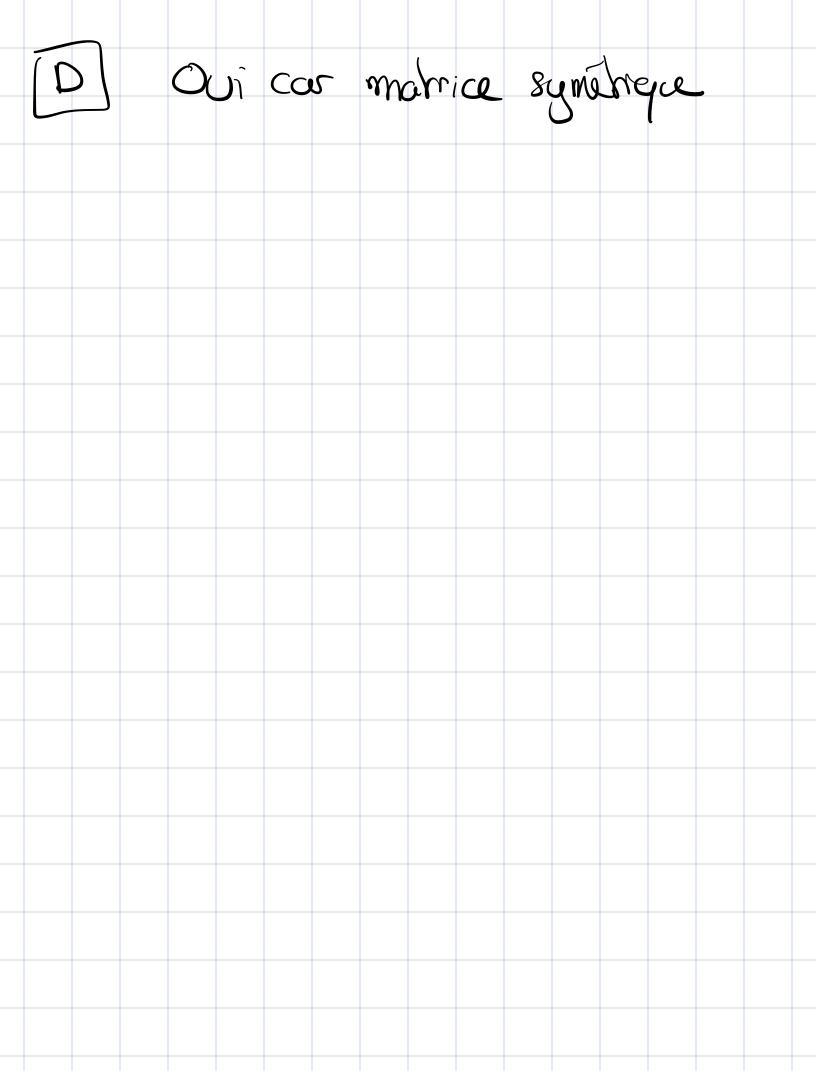
$$= (S-\lambda) - der((y-\lambda))$$

$$= (S-\lambda) - der((S-\lambda))$$

$$= (S-\lambda)^2 \cdot (4-\lambda)$$

$$\frac{1}{2} \left(\frac{3}{2} - \frac{2}{3} \right)$$

on a done 3 vedreurs propres lm. molep.



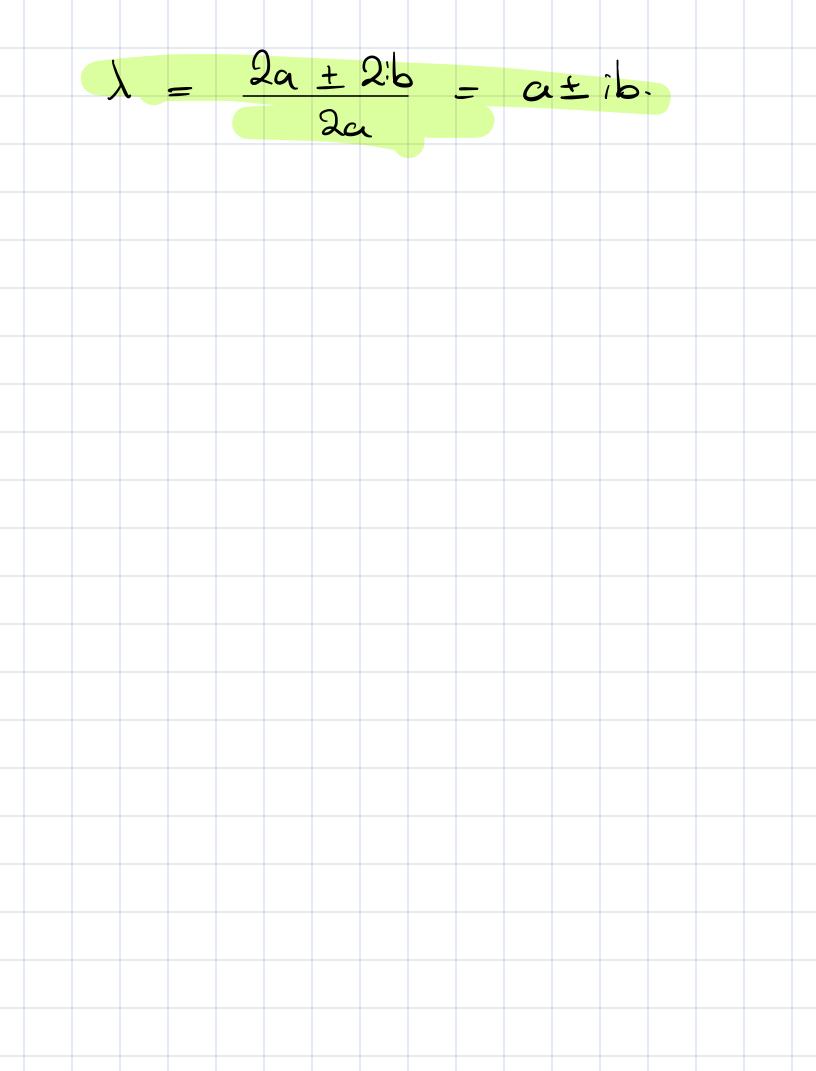
$$= (a-1)(a-1) - (-b-b)$$

$$= a^2 - a\lambda - a\lambda + \lambda^2 + 6^2$$

$$= \lambda^2 - 2a\lambda + (a^2 + b^2)$$

$$\Delta = (-2a)^2 - 4 \cdot 4 \cdot (a^2 + b^2)$$

$$-\int D^7 = 2ib$$



Exercise M

(a)
$$A$$
 ($\psi \vec{x}$) = λ ($\psi \vec{x}$)

(b) $A\vec{x} = \psi \lambda \vec{x}$ OK

Exercise S
$$(1-\lambda) 2 3 (2-\lambda) 3 (2-\lambda) 3 (2-\lambda)$$

$$= (1-\lambda) \cdot der (2-\lambda) 3 (2-\lambda)$$

$$= (1-\lambda) \cdot der (2-\lambda) 3 (2-\lambda)$$

$$+ 1 \cdot der (2-\lambda) 3 (2-\lambda)$$

$$= (1-\lambda) ((2-\lambda)(3-\lambda) - 6)$$

$$= (2(3-\lambda) - 6)$$

$$+ (6-3(2-\lambda))$$

$$= ((2-\lambda)(3-\lambda)-6) - \lambda((2-\lambda)(3-\lambda)-6)$$

$$- (6-2\lambda-6)$$

$$+ (6-(6-3\lambda))$$

$$- (6-2\lambda-3\lambda+\lambda^2-6)$$

$$- \lambda(6-2\lambda-3\lambda+\lambda^2-6)$$

$$+ 2\lambda + 3\lambda$$

$$= -2\lambda - 3\lambda + \lambda^2 + 2\lambda^2 + 3\lambda^2 - \lambda^3$$

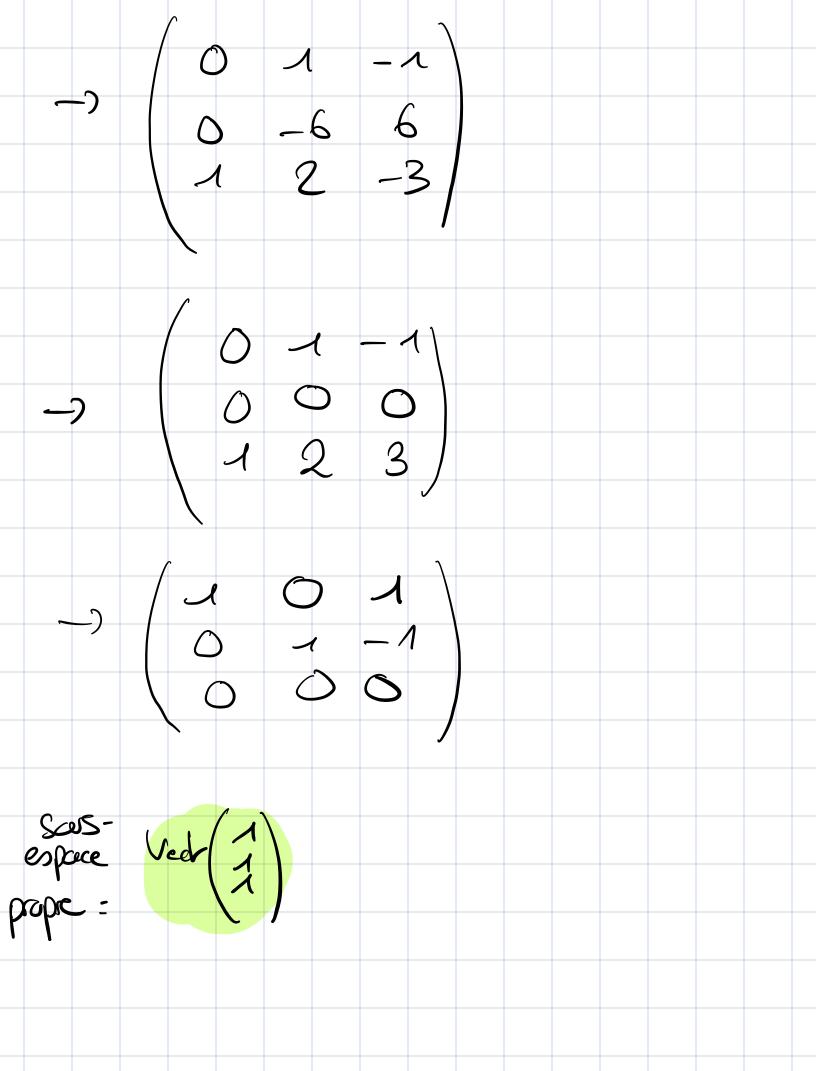
$$+ 2\lambda + 3\lambda$$

$$= -\lambda^3 + 6\lambda^2$$
Si $\lambda = 0$, ok
 $\lambda = 6$, ok

espue pagre asserté à O:

$$\ker\left(A\right) = \operatorname{vec}\left\{\begin{pmatrix} 2\\ -1\\ 0 \end{pmatrix}, \begin{pmatrix} 0\\ 1/2\\ -1/3 \end{pmatrix}\right\}$$

$$= \ker \left(\begin{array}{ccc} -S & 2 & 3 \\ 1 & -4 & 3 \\ 2 & -3 \end{array} \right)$$



Exercice 6

Si A est diagonalisable, 3D 8.t. et possède re seleur propre usque a de mllipliché 2:

NON

avec
$$D = \begin{pmatrix} a & 0 \\ 0 & \alpha \end{pmatrix}$$

$$\Rightarrow A = P^{-1}aI_nP$$

$$=$$
 $A = a In$

Exercice 7

@ matrice A non inversible

=> der (A) =0

= det (A-OI) =0

es 0 est une voleur propre de 17.

Voci

D Mahrae A dragonalisable

=> 3 Pha PDP-1 = A

Faux ?

Fax e.g
$$(11)$$

$$= (1-\lambda)(1-\lambda) - 1$$

Deux.

on houre les valeurs papres de Alen:

· traveil les sol de det (A-II) = 0.

$$= a + ib = a - ib$$

$$= a - 2ib$$

$$= \alpha - ib + c - id$$

$$(d) \overline{uz} = (a+ib) \cdot (a+id)$$

$$= (a+ib) \cdot (a+id)$$

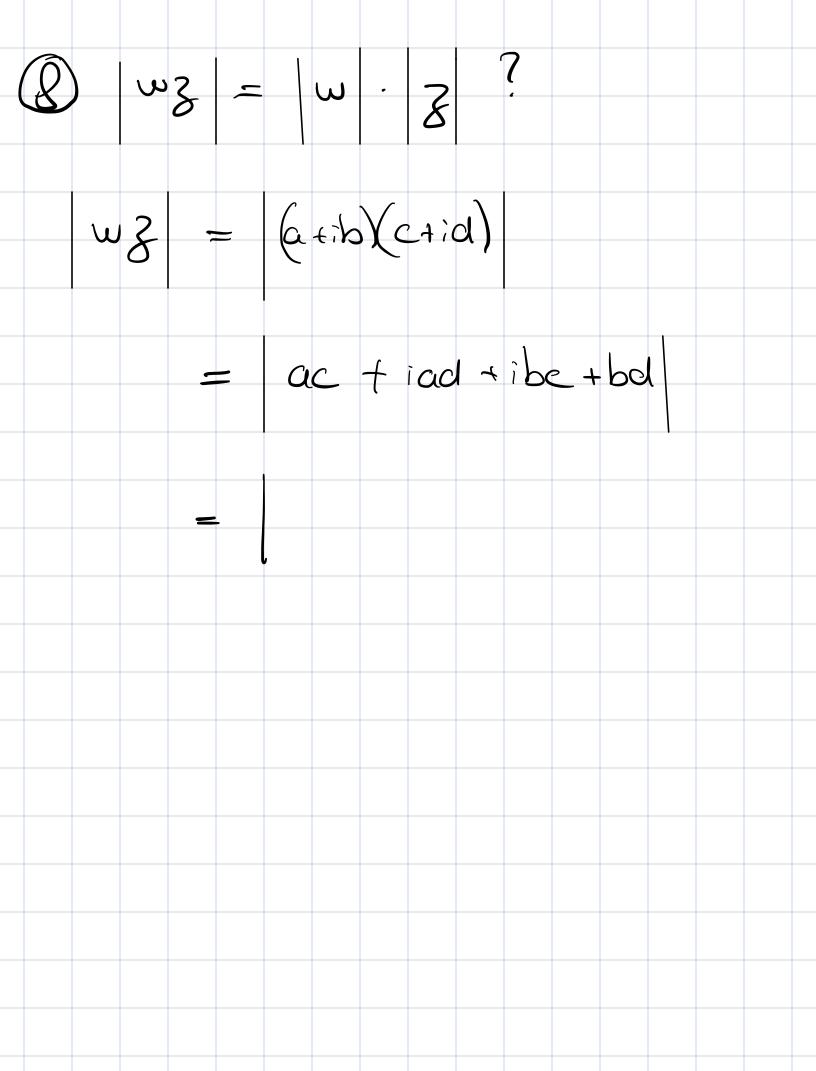
$$= (\alpha - ib) \cdot (c - id)$$

$$=\overline{\omega}-\overline{z}$$

$$C(a+ib) = ca + cib$$

$$= ca - cib$$

$$= c(a-ib)$$



$$n_{k+1} = \frac{1}{3}n_{k-1} + \frac{2}{3}n_k$$

$$A \begin{pmatrix} nk \\ nk-1 \end{pmatrix} = \begin{pmatrix} nk+1 \\ nk \end{pmatrix}$$

$$A^{k}\begin{pmatrix} 1\\ -3 \end{pmatrix} = \begin{pmatrix} n_{k+1}\\ n_{k} \end{pmatrix}$$

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

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

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$$\frac{1}{3}\begin{pmatrix} 3 & 3 \\ 3 & 3$$

ovec
$$=$$
 $=$ $\begin{pmatrix} 1 \\ -3 \end{pmatrix} = \begin{pmatrix} n_{k+1} \\ n_k \end{pmatrix}$

$$= (2/3 - \lambda)(-\lambda) - 1/3$$

$$= -(2/3)\lambda + \lambda^2 - 1/3$$

$$= \lambda^2 - (2/3)\lambda - 1/3$$

$$\Delta = (-2/3)^2 - M - 1 - (-1/3)$$

$$= \frac{4}{8} + \frac{4}{3} = \frac{16}{9}$$

kes
$$\begin{pmatrix} 1 & 1/3 \\ 1 & 1/3 \end{pmatrix}$$

$$= \begin{pmatrix} 1 & 1/3 \\ 0 & 0 \end{pmatrix}$$
Sous especie per $\lambda = -1$

$$\text{Veel } \left\{ \begin{pmatrix} 1 \\ -3 \end{pmatrix} \right\}$$

$$\text{Veel } \left\{ \begin{pmatrix} 1 \\ -3 \end{pmatrix} \right\}$$

$$\text{D} = \begin{pmatrix} 1 & 1 \\ 1 & -3 \end{pmatrix}$$

$$\text{D} = \begin{pmatrix} 1 & 0 \\ 0 & -1/3 \end{pmatrix}$$

$$\text{P}^{-1} = \frac{1}{-3-1} \begin{pmatrix} -3-1 \\ -1 & 1 \end{pmatrix}$$

$$= -\frac{1}{4} \left(\frac{-2}{-1} \right)$$

$$= -\frac{1}{4} \left(\frac{-2}{-1} \right)$$

$$= A$$

$$= A$$