1

$$A = \begin{bmatrix} \boxed{a} & 0 & 0 & 0 \\ 1 & \boxed{2} & 0 & -1 \\ 1 & 0 & \boxed{2} & -1 \\ -1+a & 0 & 0 & 1 \end{bmatrix}$$

$$|A-\lambda I| = (a-\lambda)(2-\lambda)^2(1-\lambda) = 0 \quad \begin{cases} \lambda_1 = a & (m_1=1) \\ \lambda_2 = 2 & (m_2=2) \\ \lambda_3 = 1 & (m_3=1) \end{cases}$$

$\boxed{a=2}$ $\begin{cases} \lambda_1 = 2 & (m_1=3) \\ \lambda_2 = 1 & (m_2=1) \end{cases}$

$$V(\lambda=2) \rightarrow \begin{bmatrix} 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & -1 \\ 1 & 0 & 0 & -1 \\ 1 & 0 & 0 & -1 \end{bmatrix} \; h=1 \rightarrow \dim = 4-1 = 3 = m \rightarrow \text{diagonalizable}$$

$\hookrightarrow \{ x_1 = x_4$

$\hookrightarrow B_{V_{\lambda=2}} = \{(1,0,0,1),(0,1,0,0),(0,0,1,0)\}$

$$V(\lambda=1) \rightarrow \begin{bmatrix} 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & -1 \\ 1 & 0 & 1 & -1 \\ 1 & 0 & 0 & 0 \end{bmatrix} \; h=3 \rightarrow \dim = 1$$

$\rightarrow \begin{cases} x_1 = 0 \\ x_2 = x_4 \\ x_3 = x_4 \end{cases}$ $B_{V_{\lambda=1}} = \{(0,1,1,1)\}$

$$D = \begin{bmatrix} 2 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 \\ 0 & 0 & 2 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \qquad P = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 1 \end{bmatrix}$$

$\boxed{a=1}$ $\begin{cases} \lambda_1 = 2 & (m_1=2) \\ \lambda_2 = 1 & (m_2=2) \end{cases}$

$$V_{(\lambda=2)} \rightarrow \begin{bmatrix} -1 & 0 & 0 & 0 \\ 1 & 0 & 0 & -1 \\ 1 & 0 & 0 & -1 \\ 0 & 0 & 0 & -1 \end{bmatrix} \; h=2 \rightarrow \dim = 4-2 = 2 = m_1$$

$$V_{(\lambda=1)} \rightarrow \begin{bmatrix} 0 & 0 & 0 & 0 \\ 1 & 1 & 0 & -1 \\ 1 & 0 & 1 & -1 \\ 0 & 0 & 0 & 0 \end{bmatrix} \; h=2 \rightarrow \dim = 2 \overset{\shortparallel}{} m_2$$

diagonalizable

$\rightarrow \begin{cases} x_1 = 0 \\ x_1 = x_4 \\ x_4 = 0 \end{cases}$ $B_{V_{\lambda=2}} = \{(0,1,0,0),(0,0,1,0)\}$

$\rightarrow \begin{cases} x_1 + x_2 - x_4 = 0 \\ x_1 + x_3 - x_4 = 0 \end{cases}$ $\begin{cases} x_2 = x_3 \\ x_4 = x_1 + x_2 \end{cases}$

$B_{V_{\lambda=1}} = \{(1,0,0,1),(0,1,1,1)\}$

$$D = \begin{bmatrix} 2 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \qquad P = \begin{bmatrix} 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \end{bmatrix}$$

$\boxed{a \neq 2,1}$

$$V(\lambda=2) \rightarrow \begin{bmatrix} a-2 & 0 & 0 & 0 \\ 1 & 0 & 0 & -1 \\ 1 & 0 & 0 & -1 \\ -1+a & 0 & 0 & -1 \end{bmatrix} \rightarrow \begin{cases} x_1 = 0 \\ x_4 = 0 \end{cases} \quad B_{V_{\lambda=2}} = \{(0,1,0,0),(0,0,1,0)\}$$

$h=2 \rightarrow \dim = 2 = m \rightarrow$ diagonalizable

$$V_{\lambda=a} \rightarrow \begin{bmatrix} 0 & 0 & 0 & 0 \\ 1 & 2-a & 0 & -1 \\ 1 & 0 & 2-a & -1 \\ -1+a & 0 & 0 & 1-a \end{bmatrix} \rightarrow \begin{cases} x_1+(2-a)x_2 = x_4 \\ x_1+(2-a)x_3 = x_4 \\ \cancel{(-1+a)}x_1 = \cancel{(-1+a)}x_4 \end{cases} \begin{cases} x_2 = 0 \\ x_3 = 0 \\ x_1 = x_4 \end{cases} \quad B_{V_{\lambda=a}} = \{(1,0,0,1)\}$$

$h=3 \rightarrow \dim = 1$

$$V_{\lambda=1} \rightarrow \begin{bmatrix} a-1 & 0 & 0 & 0 \\ 1 & 1 & 0 & -1 \\ 1 & 0 & 1 & -1 \\ -1+a & 0 & 0 & 0 \end{bmatrix} \rightarrow \begin{cases} x_1 = 0 \\ x_2 = x_4 \\ x_3 = x_4 \end{cases} \quad B_{V_{\lambda=1}} = \{(0,1,1,1)\}$$

$h=3 \rightarrow \dim = 1$

$$D = \begin{bmatrix} a & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 \\ 0 & 0 & 2 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \qquad P = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 1 \end{bmatrix}$$

---

(2)

$$\left[\begin{array}{cccc|c} -1 & 1 & -2 & -a & -6 \\ -2 & 1 & 1 & 5 & 2(1-a) \\ 2 & 1 & -2 & -2a & a \\ 3 & 0 & -1 & -4 & 8 \end{array}\right] \xrightarrow[\substack{E_3+2E_1 \\ E_4+3E_1}]{E_2-2E_1} \left[\begin{array}{cccc|c} -1 & 1 & -2 & -a & -6 \\ 0 & -1 & 5 & 5+2a & 14-2a \\ 0 & 3 & -6 & -4a & a-12 \\ 0 & 3 & -7 & -4-3a & -10 \end{array}\right] \xrightarrow[E_4+3E_2]{E_3+3E_2}$$

$$\rightarrow \left[\begin{array}{cccc|c} -1 & 1 & -2 & -a & -6 \\ 0 & -1 & 5 & 5+2a & 14-2a \\ 0 & 0 & 9 & 15+2a & 30-5a \\ 0 & 0 & 8 & 11+3a & 32-6a \end{array}\right] \xrightarrow{E_4-\frac{8}{9}E_3} \left[\begin{array}{cccc|c} -1 & 1 & -2 & -a & -6 \\ 0 & -1 & 5 & 5+2a & 14-2a \\ 0 & 0 & 9 & 15+2a & 30-5a \\ 0 & 0 & 0 & -\frac{7}{3}+\frac{11}{9}a & \frac{16}{3}-\frac{8}{9}a \end{array}\right]$$

$\frac{11}{9}a = \frac{7}{3} \rightarrow a = \frac{21}{11}$

$\frac{16}{3} = \frac{8}{9}a \rightarrow a = 6$

$$\left[\begin{array}{cccc|c} x & x & x & x & x \\ 0 & x & x & x & x \\ 0 & 0 & x & x & x \\ 0 & 0 & 0 & 0 & x \end{array}\right]$$

$h(A) = 3 < 4 = h(A_z)$

BATERAEZINA

$a \neq \frac{21}{11}$

$$\left[\begin{array}{cccc|c} x & x & x & x & x \\ 0 & x & x & x & x \\ 0 & 0 & x & x & x \\ 0 & 0 & 0 & x & x \end{array}\right]$$

$h(A) = 4 = h(A_z)$
$\quad\ \ \parallel$
ezez. kop.

BATERAGARRI ZEHAZTUA

$a \neq \frac{21}{11}$: $\begin{cases} t = \dfrac{48-14a}{11a-21} \\ z = \dfrac{-150+61a-3a^2}{11a-21} \\ y = \dfrac{-216+135a-21a^2}{11a-21} \\ x = \dfrac{-42+31a-a^2}{11a-21} \end{cases}$

---

(3) a) $f[p(x)] = p(x)^2$?

i) $f(x) + f(y) = f(x+y)$

$f(x) + f(y) = a_1^2 + 2a_1b_1x + b_1^2x^2 + a_2^2 + 2a_2b_2 + b_2^2x^2 =$

$= a_1^2 + a_2^2 + 2(a_1b_1 + a_2b_2) + (b_1^2 + b_2^2)x^2$

$\#$

$f(x+y) = \underbrace{(a_1+a_2)^2}_{a_1^2+a_2^2+2a_1a_2} + 2\underbrace{(a_1+a_2)(b_1+b_2)}_{a_1b_1+a_2b_2+a_1b_2+a_2b_1}x + \underbrace{(b_1+b_2)^2}_{b_1^2+b_2^2+2b_1b_2}x^2$

NO es aplicación lineal

b) Núcleo $\rightarrow p(x) = 0$: $\begin{cases} a = -b \\ b = -c \\ c = -d \end{cases} \longrightarrow \begin{bmatrix} a & 0 & 0 & 0 \\ 0 & -a & 0 & 0 \\ 0 & 0 & a & 0 \\ 0 & 0 & 0 & -a \end{bmatrix}$

$f\left(\begin{bmatrix} a & 0 & 0 & 0 \\ 0 & b & 0 & 0 \\ 0 & 0 & c & 0 \\ 0 & 0 & 0 & d \end{bmatrix}\right) \Rightarrow (a+b) + (b+c)x + (c+d)x^2 = p(x)$

4) a)

$$U = Span\left\{ \begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 2 \\ 1 & 0 \end{bmatrix}, \begin{bmatrix} -1 & 0 \\ 2 & -1 \end{bmatrix}, \begin{bmatrix} 0 & 3 \\ 0 & 1 \end{bmatrix} \right\}$$

$$\begin{bmatrix} 1 & 0 & -1 & 0 \\ 1 & 2 & 0 & 3 \\ 0 & 1 & 2 & 0 \\ 0 & 0 & -1 & 1 \end{bmatrix} \xrightarrow{E_2 - E_1} \begin{bmatrix} 1 & 0 & -1 & 0 \\ 0 & 2 & 1 & 3 \\ 0 & 1 & 2 & 0 \\ 0 & 0 & -1 & 1 \end{bmatrix} \xrightarrow{E_3 - \frac{E_2}{2}} \begin{bmatrix} 1 & 0 & -1 & 0 \\ 0 & 2 & 1 & 3 \\ 0 & 0 & 3/2 & -3/2 \\ 0 & 0 & -1 & 1 \end{bmatrix} \xrightarrow{E_4 + \frac{2}{3}E_3} \begin{bmatrix} 1 & 0 & -1 & 0 \\ 0 & 2 & 1 & 3 \\ 0 & 0 & 3/2 & -3/2 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

$h = 3$

$\boxed{\dim U = 3}$

$$\boxed{B_U = \left\{ \begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 2 \\ 1 & 0 \end{bmatrix}, \begin{bmatrix} -1 & 0 \\ 2 & -1 \end{bmatrix} \right\}}$$

$$\begin{vmatrix} 1 & 0 & -1 & x_1 \\ 1 & 2 & 0 & x_2 \\ 0 & 1 & 2 & x_3 \\ 0 & 0 & -1 & x_4 \end{vmatrix} \xrightarrow{E_2 - E_1} \begin{vmatrix} 1 & 0 & -1 & x_1 \\ 0 & 2 & 1 & x_2 - x_1 \\ 0 & 1 & 2 & x_3 \\ 0 & 0 & -1 & x_4 \end{vmatrix} = 1 \cdot \begin{vmatrix} 2 & 1 & x_2 - x_1 \\ 1 & 2 & x_3 \\ 0 & -1 & x_4 \end{vmatrix} = 4x_4 - x_2 + x_1 - x_4 + 2x_3 = 0$$

$$\boxed{x_1 - x_2 + 2x_3 + 3x_4 = 0}$$

b) ecuación: $x_1 - x_2 + 2x_3 + 3x_4 = 0$

$0 + 1 + 2 - 3 = 0$ ✓

Sí pertenece

vector: $\begin{bmatrix} 0 & -1 \\ 1 & -1 \end{bmatrix}$

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5) W: $\begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 1 \end{bmatrix} \xrightarrow{E_3 + E_1} \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 0 & 1 & 1 \end{bmatrix} \xrightarrow{E_3 - E_2} \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 0 \end{bmatrix}$ $B_W = \{(1,0,-1),(1,1,0)\}$

$$\begin{vmatrix} 1 & 1 & x_1 \\ 0 & 1 & x_2 \\ -1 & 0 & x_3 \end{vmatrix} \xrightarrow{E_3 + E_1} \begin{vmatrix} 1 & 1 & x_1 \\ 0 & 1 & x_2 \\ 0 & 1 & x_3 + x_1 \end{vmatrix} \xrightarrow{E_3 - E_2} \begin{vmatrix} 1 & 1 & x_1 \\ 0 & 1 & x_2 \\ 0 & 0 & x_3 + x_1 - x_2 \end{vmatrix} = 0 \longrightarrow x_3 = x_2 - x_1$$

H: $x_1 + x_2 + x_3 = 0$; $x_3 = -x_1 - x_2$ $B_H = \{(1,0,-1,(0,1,-1)\}$

$W \cap H$: $\left.\begin{array}{l} x_3 = -x_1 - x_2 \\ x_3 = x_2 - x_1 \end{array}\right\} -x_1 - x_2 = x_2 - x_1 \longrightarrow x_2 = 0$

$B_{W \cap H} = \{(1,0,-1)\}$

$$\begin{bmatrix} 1 & 1 & 1 \\ 1 & -1 & 1 \end{bmatrix} \xrightarrow{E_2 - E_1} \begin{bmatrix} 1 & 1 & 1 \\ 0 & -2 & 0 \end{bmatrix}$$

ecuaciones lin. ind. $\longrightarrow$ $\dim(W \cap H) = 1$

$W + H$: $\dim(W+H) = \dim W + \dim H - \dim(W \cap H) = 2 + 2 - 1 = 3$

$W + H = P_2(x)$ $\quad B_{W+H} = \{(1,0,0), (0,1,0), (0,0,1)\}$

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1. deitura / 1er apellido		Titulazioa / Titulación
2. deitura / 2º apellido		Ikasgaia / Asignatura
Izena / Nombre		Data / Fecha
Ikasturtea / Curso	Taldea / Grupo	Kalifikazioa / Calificación

6) $C_{B_1}(A) = \begin{pmatrix} 1 \\ -1 \\ 1 \\ -1 \end{pmatrix} \Rightarrow A = 1 \cdot \begin{bmatrix} 1 & 0 \\ -1 & 1 \end{bmatrix} - 1 \begin{bmatrix} 2 & -1 \\ 1 & 3 \end{bmatrix} + 1 \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} - 1 \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} =$

$$A = \begin{bmatrix} 1-2 & 1+1+1 \\ -1-1+1-1 & 1-3 \end{bmatrix} = \boxed{\begin{bmatrix} -1 & 3 \\ -2 & -2 \end{bmatrix}}$$

1 Punto

$$\begin{bmatrix} -1 & 3 \\ -2 & -2 \end{bmatrix} = \alpha_1 \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix} + \alpha_2 \begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix} + \alpha_3 \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix} + \alpha_4 \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix} \Rightarrow$$

$-1 = \alpha_1 + \alpha_2 + \alpha_3 + \alpha_4$

$3 = \alpha_2 + \alpha_3 + \alpha_4$

$-2 = \alpha_3 + \alpha_4$

$-2 = \alpha_4$

$\alpha_1 = -1 - \alpha_2 - \alpha_3 - \alpha_4 = -1 - 5 - 0 + 2 = -4$

$\alpha_2 = 3 - \alpha_3 - \alpha_4 = 3 - 0 + 2 = 5$

$\alpha_3 = -2 - \alpha_4 = -2 + 2 = 0$

$\rightarrow \alpha_4 = -2$

$$\boxed{C_{B_2}(A) = \begin{pmatrix} -4 \\ 5 \\ 0 \\ -2 \end{pmatrix}}$$

1 Punto

$P \cdot C_{B'} = C_B$

$$P = \begin{pmatrix} 3 & 3 & 3 & 1 \\ -1 & -1 & -1 & 0 \\ \frac{5}{2} & 2 & \frac{5}{2} & \frac{1}{2} \\ \frac{3}{2} & 2 & \frac{5}{2} & \frac{3}{2} \end{pmatrix} \begin{pmatrix} x_1' \\ x_2' \\ x_3' \\ x_4' \end{pmatrix} = \begin{pmatrix} 1 \\ -1 \\ 1 \\ -1 \end{pmatrix}$$

7) $\langle x, y\rangle = x_1 y_1 - x_1 y_2 - x_2 y_1 + 2x_2 y_2 + x_2 y_3 + x_3 y_2 + 2x_3 y_3$

$$\langle x,y\rangle = \begin{pmatrix} x_1 & x_2 & x_3 \end{pmatrix} \begin{bmatrix} 1 & -1 & 0 \\ -1 & 2 & 1 \\ 0 & 1 & 2 \end{bmatrix} \begin{pmatrix} y_1 \\ y_2 \\ y_3 \end{pmatrix} =$$

a) Positividad: $G \Rightarrow$ Definida positiva

$$G = \begin{bmatrix} 1 & -1 & 0 \\ -1 & 2 & 1 \\ 0 & 1 & 2 \end{bmatrix}$$

$\Delta_1 = |1| > 0$

$\Delta_2 = \begin{vmatrix} 1 & -1 \\ -1 & 2 \end{vmatrix} = 1 > 0$

$\Delta_3 = \begin{vmatrix} 1 & -1 & 0 \\ -1 & 2 & 1 \\ 0 & 1 & 2 \end{vmatrix} = 4 - 1 - 2 = 1 > 0$

1 PUNTO

b) Simetría: $G \Rightarrow$ SIMÉTRICA

c) BILINEALIDAD : $\exists\, G_{3\times 3}$

c) $B = \left\{ \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} \right\}$
$e_1 \quad e_2 \quad e_3$

$$\boxed{B_{\text{ORTOGONAL}} = \left\{ \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix} \begin{pmatrix} -1 \\ -1 \\ 1 \end{pmatrix} \right\}}$$

1 PUNTO

$e'_1 = e_1 = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$

$e'_2 = e_2 + \alpha e'_1 = \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} + \begin{pmatrix} \alpha \\ 0 \\ 0 \end{pmatrix} = \begin{pmatrix} \alpha \\ 1 \\ 0 \end{pmatrix}$; $\langle e'_1, e'_2\rangle = 0$

$$(\alpha\ 1\ 0) \begin{bmatrix} 1 & -1 & 0 \\ -1 & 2 & 1 \\ 0 & 1 & 2 \end{bmatrix} \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} = (\alpha\ 1\ 0) \begin{pmatrix} 1 \\ -1 \\ 0 \end{pmatrix} = 0 = \alpha - 1 = 0 \Rightarrow \boxed{\alpha = 1} \;;\; e'_2 = \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}$$

$$e'_3 = e_3 + \alpha e'_1 + \beta e'_2 = \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} + \begin{pmatrix} \alpha \\ 0 \\ 0 \end{pmatrix} + \begin{pmatrix} \beta \\ \beta \\ 0 \end{pmatrix} = \begin{pmatrix} \alpha+\beta \\ \beta \\ 1 \end{pmatrix} = \begin{pmatrix} -1 \\ -1 \\ 1 \end{pmatrix}$$

$$\langle e'_1, e'_3\rangle = 0 \Rightarrow (\alpha+\beta,\ \beta,\ 1) \begin{bmatrix} 1 & -1 & 0 \\ -1 & 2 & 1 \\ 0 & 1 & 2 \end{bmatrix} \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} = (\alpha+\beta,\ \beta,\ 1) \begin{pmatrix} 1 \\ -1 \\ 0 \end{pmatrix} = \alpha + \beta - \beta = 0 \Rightarrow \alpha = 0$$

$$\langle e'_2, e'_3\rangle = 0 \Rightarrow (\alpha+\beta,\ \beta,\ 1) \begin{bmatrix} 1 & -1 & 0 \\ -1 & 2 & 1 \\ 0 & 1 & 2 \end{bmatrix} \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix} = (\alpha+\beta,\ \beta,\ 1) \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix} = \beta + 1 = 0 \Rightarrow \beta = -1$$

8) a) $\left[\begin{array}{c|ccc} -2 & 0 & 0 & 0 \\ \hline 0 & -2 & 1 & 0 \\ 0 & 0 & -2 & 1 \\ 0 & 0 & 0 & -2 \end{array}\right]$

Dos Bloques: $\Rightarrow$

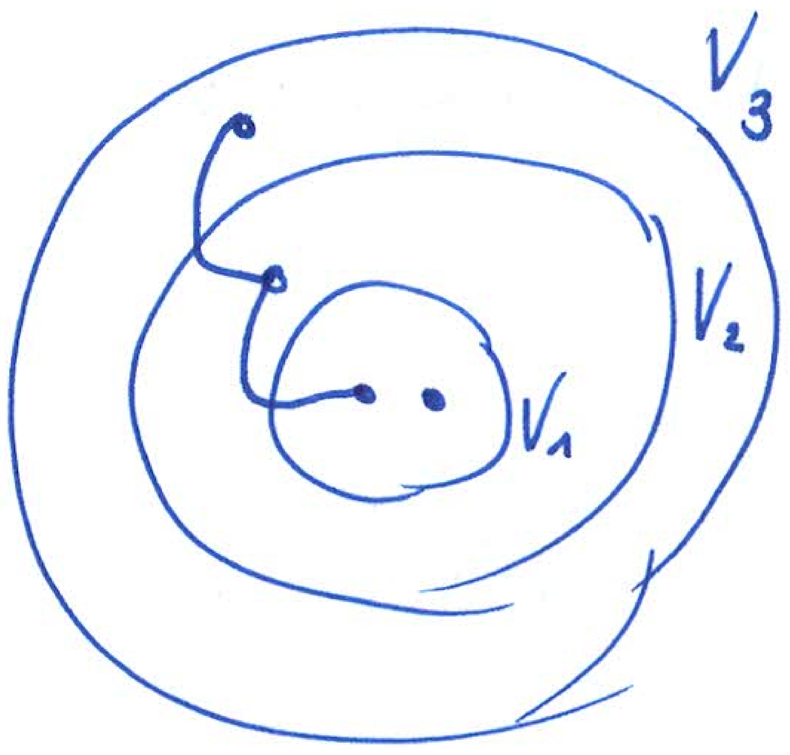
$\lambda = -2 \quad m = 4 \quad \mu = 2$

0,5 CADA.
HABLAR DE $(A-\lambda I)^P$ 0,5

$V_1(\lambda=-2) \Rightarrow (A+2I)x=0 \Rightarrow$ Dim $= 2$

$V_2(\lambda=-2) \Rightarrow (A+2I)^2x=0 \Rightarrow$ Dim $= 3$

$V_3(\lambda=-2) \Rightarrow (A+2I)^3x=0 \Rightarrow$ Dim $= 4$



b) $\left[\begin{array}{cc|ccc} 1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ \hline 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 1 \end{array}\right]$

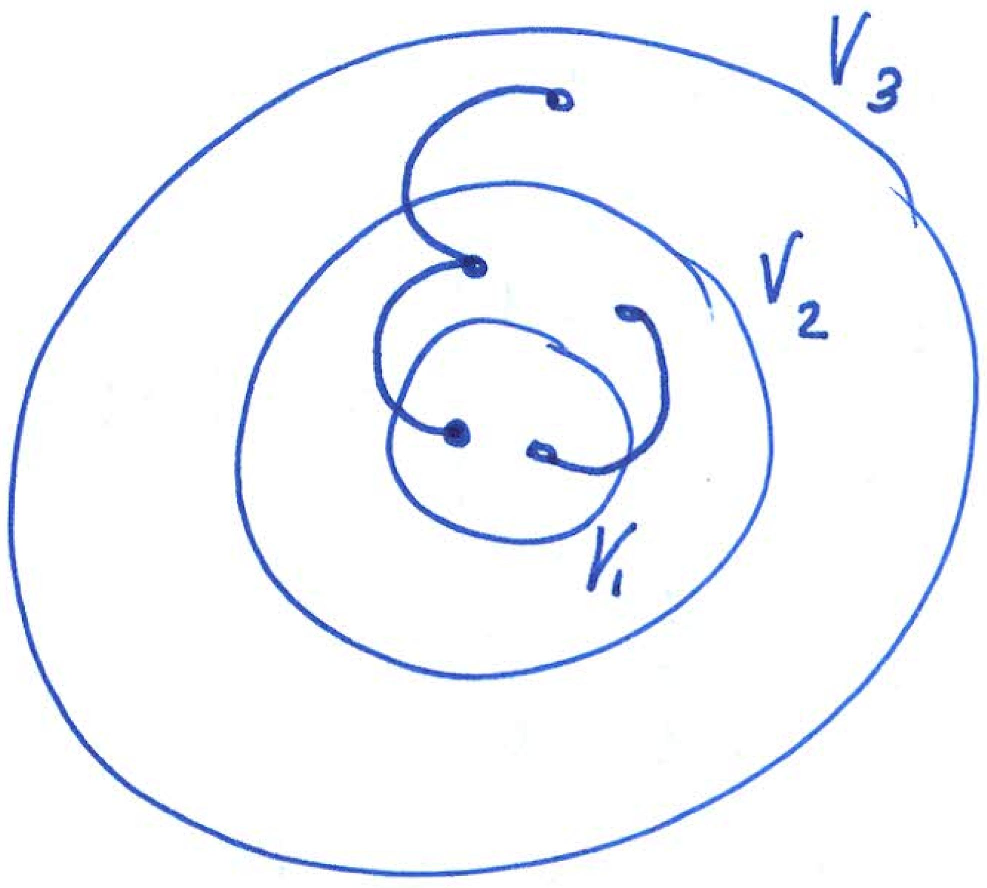
Dos Bloques

$\lambda = 1 \quad m = 5 \quad \mu = 2$

$V_1(\lambda=1) \quad (A-I)x=0 \Rightarrow$ Dim $= 2$

$V_2(\lambda=1) \quad (A-I)^2x=0 \Rightarrow$ Dim $= 4$

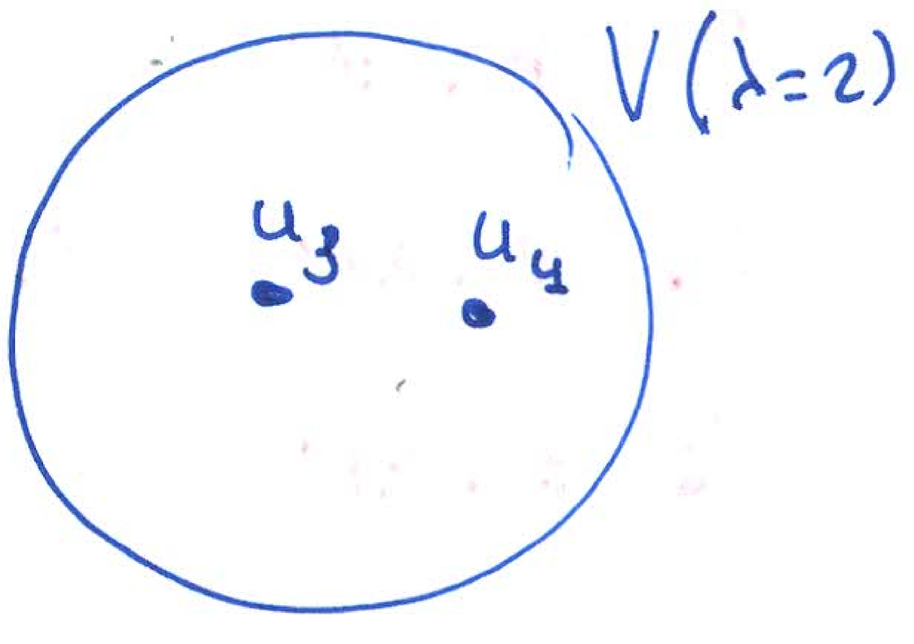
$V_3(\lambda=1) \quad (A-I)^3x=0 \Rightarrow$ Dim $= 5$



c) $\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 2 & 0 \\ 0 & 0 & 0 & 2 \end{bmatrix}$

$\lambda = 2 \quad m = 2 \quad \mu = 2$

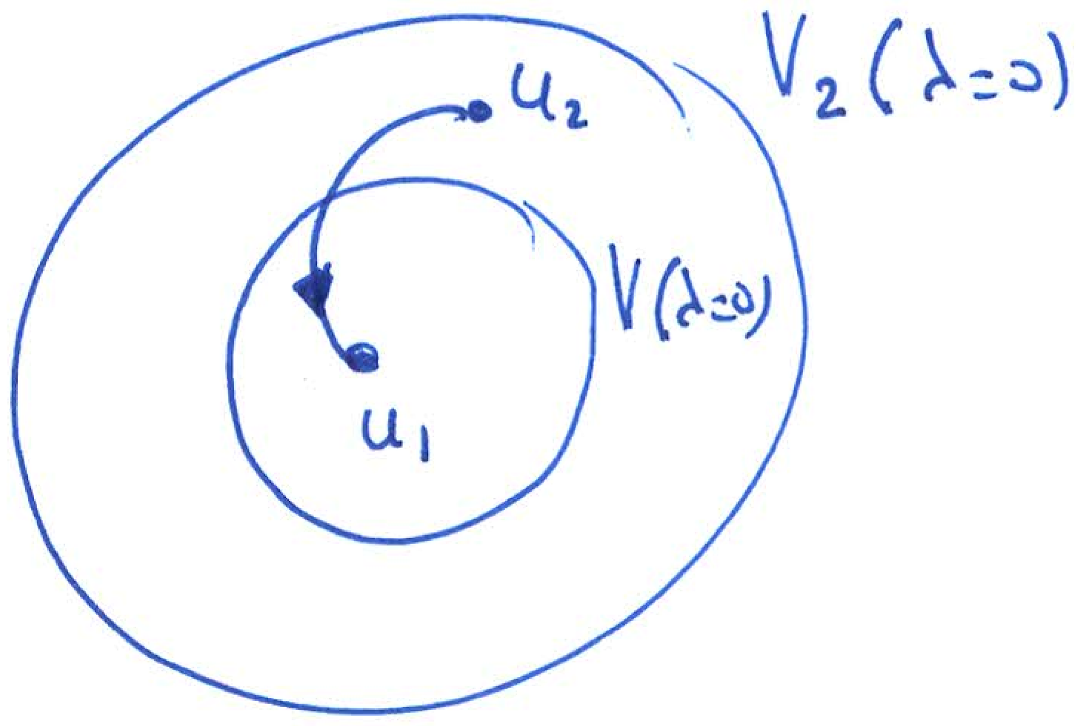
$\lambda = 0 \quad m = 2 \quad \mu = 1$



$V(\lambda=2) \quad (A-2I)x=0 \Rightarrow$ Dim $= 2$

$V(\lambda=0) \quad (A)x=0 \Rightarrow$ Dim $= 1$

$V_2(\lambda=0) \quad (A)^2x=0 \Rightarrow$ Dim $= 2$



9) a) CORRECTO: AMBAS MATRICES TIENEN TRES VALORES PROPIOS DISTINTOS: SON DIAGONALIZABLES Y SEMEJANTES.

b) FALSO: UNA MATRIZ SINGULAR SOLO IMPLICA QUE EXISTE UN VALOR PROPIO $\lambda = 0$

c) Falso: Dos matrices equivalentes tienen igual dimensión e igual rango.

d) $\begin{bmatrix} 1 & -1 & 0 \\ -1 & 1 & 1 \\ 0 & 1 & -2 \end{bmatrix}$ Debe ser simétrica definida positiva.

$\Delta_1 = |1| = 1 > 0$

$\Delta_2 = \begin{vmatrix} 1 & -1 \\ -1 & 1 \end{vmatrix} = 1 - 1 = 0 \not> 0 \longrightarrow$ NO ES DEFINIDA POSITIVA.

$\Delta_3 = \begin{vmatrix} 1 & -1 & 0 \\ -1 & 1 & 1 \\ 0 & 1 & -2 \end{vmatrix}$

ES FALSO

3 BIEN 1

2 BIEN 0,5

4 BIEN 2