Monitoria 03/03/2021 Wednesday, March 3, 2021 2:15 PM  $f(x) = x^T A x$  $=5x_{1}^{2}-x_{2}^{2}+2x_{1}x_{2}$ f(x) = xt Ax = x2+2y2+3z2 - 6xz + 2yz  $X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$   $A = \begin{bmatrix} 2 & 0 & -2 \\ 0 & -3 & 0 \\ -1 & 0 & 1 \end{bmatrix}$ (13)  $2x_1^2 + 5x_2^2 - 4k_1x_1$   $\lambda_1 y_1^2 + \lambda_2 y_2^2$  $Q^{\dagger}AQ = D$  $\begin{cases} \lambda_1 & 0 \\ 0 & \lambda_2 \end{cases}$ QDQT = A  $A = \begin{bmatrix} 2 & -2 \\ -2 & 5 \end{bmatrix}$   $det(A - \lambda I) = 0$  $det \begin{bmatrix} 2-\lambda & -2 \\ -2 & 5-\lambda \end{bmatrix} = 0$  $(2-\lambda)(5-\lambda)-4=0$  $(\lambda - 2)(\lambda - 5) - 4 = 0$  $\lambda^{2} - 7\lambda + 6 = 0$   $\lambda_{1} = 6$   $\lambda_{2} = 1$  $k = \begin{bmatrix} x_1 \\ x_n \end{bmatrix} \quad \left( x = Qy \right) \quad \longleftarrow \quad y = Q^T \times$  $f(y) = 6y_1^2 + y_2^2$   $y = 0^{\frac{1}{2}} \times [x_2]$  $\left[\begin{array}{c} 0 \\ -1 \end{array}\right] \qquad \left[\begin{array}{c} 0 \\ 2 \end{array}\right] = \left[\begin{array}{c} 2 \\ 1 \end{array}\right]$  $Q = \begin{bmatrix} 1 & 2 \\ 1 & 7 \end{bmatrix}$   $= \begin{bmatrix} 1 & 2 \\ -2 & 1 \end{bmatrix}$  $x_1^2 + x_2^2 - 2x_1x_2$ existem X ≠ 0, tel que f(x) = 0, por ex.  $x = \begin{bmatrix} 2 \\ 2 \end{bmatrix}$  $f(x) = x^T A x \qquad f(y) = y^T D y$ a) A dej pos 2 1, ..., 1/2 > 0 b) A sem; def. pos + 1, ..., 1, >0 A indef. => = = = = tal que 1:>0 e 1; <0 Max. e nin. de f(x) = xTAx sujeita à restrição 1/x11=1  $\begin{cases} \lambda_1 = 2 \\ \lambda_2 = 0 \end{cases}$ Q, tal que A=QAQT  $Q = \begin{bmatrix} \frac{1}{9} & \frac{1}{9} & \frac{1}{9} \\ \frac{1}{9} & \frac{1}{9} & \frac{1}{9} \end{bmatrix}$  of  $f_{máx} = f(g_{h}) = \lambda_{h}$ 9,=[1/12]  $9_2 = \begin{bmatrix} 1/\sqrt{2} \\ 1/\sqrt{2} \end{bmatrix}$ 入」 ストン ー・マルカ frés = 2 ||X|| = 1 -0 Ocornem em Ji e - 41 finin = 0 - 92 e - 92  $f(x) = x^T A x = f(-x) = (-x)^T A (-x)$ Antonchres det(A-11)=0 1=2 hesolvends o sistema temps:  $A - \lambda I = \begin{bmatrix} -1 & -1 \\ -1 & -1 \end{bmatrix}$   $= 0 \quad x_1 - x_2 = 0 \quad x_3 = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$  $\det \begin{bmatrix} 1-\lambda & -1 \\ -1 & 1-\lambda \end{bmatrix} = 0$  $(\lambda - 1)^2 - 1 = 0$ 12 = 0  $\lambda^{2}-2\lambda=0$   $\lambda(\lambda-2)=0$   $\lambda_{2}=0$   $A-4I=\begin{bmatrix}1 & -1\\ -1 & 1\end{bmatrix}$ Solutions de systems  $\lambda(\lambda-2)=0$   $\lambda_{2}=0$   $\lambda_{3}=0$   $\lambda_{4}=0$   $\lambda_{5}=0$   $\lambda_{5}=0$   $\lambda_{5}=0$   $\lambda_{5}=0$   $\lambda_{5}=0$   $\lambda_{5}=0$   $\lambda_{5}=0$   $\lambda_{5}=0$   $\lambda_{5}=0$   $\lambda_{5}=0$ hoamos então Oz= Assim como los 11 = 110211 = 132+32 = 52 então  $9_1 = \begin{bmatrix} 1/\sqrt{2} \\ -1/\sqrt{2} \end{bmatrix}$  e  $9_2 = \begin{bmatrix} 1/\sqrt{2} \\ 1/\sqrt{2} \end{bmatrix}$