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b) $QVQ: A$ simetrica $\Rightarrow V_1 \perp V_2$ $\begin{cases} AV_4 = \lambda_1 V_4 \\ AV_2 = \lambda_2 V_2 \end{cases} \Leftrightarrow \begin{cases} V_2^T A V_4 = \lambda_1 V_2^T V_4 \\ V_1^T A V_2 = \lambda_2 V_1^T V_2 \end{cases} = \lambda_1 V_2^T V_4$ $\begin{cases} (V_2^T A V_4)^T = (\lambda_1 V_2^T V_4)^T = \lambda_1 V_2^T V_4 \\ V_1^T A V_2 = \lambda_2 V_1^T V_2 \end{cases} = \lambda_1 V_2^T V_4$ $(V_2^T A V_4)^T = (AV_4)^T V_2 = V_4^T A^T V_2 = V_4^T A V_2$ $A \text{ simetrica} \Rightarrow A^T = A$ $\Leftrightarrow \begin{cases} V_1^T A V_2 = \lambda_1 V_2^T V_4 \\ V_1^T A V_2 = \lambda_2 V_1^T V_2 \end{cases} = \lambda_1 V_1^T V_2$ $\Leftrightarrow \lambda_1 V_1^T V_2 = \lambda_2 V_1^T V_2$
$\langle = \rangle \begin{cases} (\bigvee_{z}^{T} A \bigvee_{z})^{T} = (\lambda_{1} \bigvee_{z}^{T} \bigvee_{1})^{T} = \lambda_{1} \bigvee_{z}^{T} \bigvee_{1} \\ \bigvee_{1}^{T} A \bigvee_{z} = \lambda_{z} \bigvee_{1}^{T} \bigvee_{z} \end{cases}$ $(\bigvee_{z}^{T} A \bigvee_{z})^{T} = (A \bigvee_{1})^{T} \bigvee_{z} = \bigvee_{1}^{T} A^{T} \bigvee_{z} = \bigvee_{1}^{T} A \bigvee_{z} \\ A \text{ simetrica} \Rightarrow A^{T} = A$ $\langle = \rangle \begin{cases} \bigvee_{1}^{T} A \bigvee_{z} = \lambda_{1} \bigvee_{1}^{T} \bigvee_{1} = \lambda_{1} \bigvee_{1}^{T} \bigvee_{2} \\ \bigvee_{1}^{T} A \bigvee_{z} = \lambda_{2} \bigvee_{1}^{T} \bigvee_{2} \end{cases}$
$\langle = \rangle \begin{cases} (\bigvee_{z}^{T} A \bigvee_{z})^{T} = (\lambda_{1} \bigvee_{z}^{T} \bigvee_{1})^{T} = \lambda_{1} \bigvee_{z}^{T} \bigvee_{1} \\ \bigvee_{1}^{T} A \bigvee_{z} = \lambda_{z} \bigvee_{1}^{T} \bigvee_{z} \end{cases}$ $(\bigvee_{z}^{T} A \bigvee_{z})^{T} = (A \bigvee_{1})^{T} \bigvee_{z} = \bigvee_{1}^{T} A^{T} \bigvee_{z} = \bigvee_{1}^{T} A \bigvee_{z} \\ A \text{ simétrica} \Rightarrow A^{T} = A$ $\langle = \rangle \begin{cases} \bigvee_{1}^{T} A \bigvee_{z} = \lambda_{1} \bigvee_{1}^{T} \bigvee_{1} = \lambda_{1} \bigvee_{1}^{T} \bigvee_{2} \\ \bigvee_{1}^{T} A \bigvee_{z} = \lambda_{2} \bigvee_{1}^{T} \bigvee_{2} \end{cases}$
$(\sqrt{2} \Delta \gamma_{1})^{T} = (\Delta V_{1})^{T} V_{2} = \gamma_{1}^{T} \Delta^{T} V_{2} = V_{1}^{T} \Delta V_{2}$ $A \text{ simétrica.} \Rightarrow \Delta^{T} = \Delta$ $\Leftrightarrow \begin{cases} V_{1}^{T} \Delta V_{2} = \lambda_{1} V_{2}^{T} V_{1} = \lambda_{1} V_{1}^{T} V_{2} \\ V_{1}^{T} \Delta V_{2} = \lambda_{2} V_{1}^{T} V_{2} \end{cases}$
$(\bigvee_{z}^{T} A \bigvee_{z})^{T} = (A \bigvee_{1})^{T} \bigvee_{z} = \bigvee_{1}^{T} A^{T} \bigvee_{z} = \bigvee_{1}^{T} A \bigvee_{z}$ $A \text{ simétrica} \Rightarrow A^{T} = A$ $\Leftrightarrow \begin{cases} \bigvee_{1}^{T} A \bigvee_{2} = \lambda_{1} \bigvee_{1}^{T} \bigvee_{1} = \lambda_{1} \bigvee_{1}^{T} \bigvee_{2} \\ \bigvee_{1}^{T} A \bigvee_{2} = \lambda_{2} \bigvee_{1}^{T} \bigvee_{2} \end{cases}$
$(\sqrt{2} \Delta \gamma_{1})^{T} = (\Delta \gamma_{1})^{T} \gamma_{2} = \gamma_{1}^{T} \Delta^{T} \gamma_{2} = \gamma_{1}^{T} \Delta \gamma_{2}$ $A \text{ simétrica} \Rightarrow \Delta^{T} = \Delta$ $\Leftrightarrow \begin{cases} \sqrt{1} \Delta \gamma_{2} = \lambda_{1} \sqrt{1} \gamma_{2} \\ \gamma_{1}^{T} \Delta \gamma_{2} = \lambda_{2} \sqrt{1} \gamma_{2} \end{cases}$ $= \lambda_{1} \sqrt{1} \gamma_{2}$
$\Leftrightarrow \lambda_1 V_1^{T} V_2 = \lambda_2 V_1^{T} V_2$
$(\Rightarrow) (\lambda_1 - \lambda_2) \vee_1^{\top} \vee_2 = O \qquad \lambda_1 \neq \lambda_2 \Rightarrow \lambda_1 - \lambda_2 \neq O$
$\langle = \rangle (\lambda_1 - \lambda_2) \vee_1^{T} \vee_2 = \mathcal{O} \qquad \lambda_1 \neq \lambda_2 \Rightarrow \lambda_1 - \lambda_2 \neq \mathcal{O}$ $\langle = \rangle \vee_1^{T} \vee_2 = \mathcal{O}$
$\cdot \cdot $