

FORMULE SPESSE USATE

$$1) \|\underline{z}\|^2 = \underline{z}^T \cdot \underline{z}$$

$$2) (\underline{z} \underline{y})^T = \underline{y}^T \underline{z}$$

$$3) z \text{ SCALARE } \Rightarrow \underline{z}' = z$$

$$4) f(\underline{z}) = \begin{cases} \textcircled{a} \underline{z}' Q \underline{z} + 2 \underline{c}' \underline{z} \\ \textcircled{b} \frac{1}{2} \underline{z}' Q \underline{z} + \underline{c}' \underline{z} \end{cases} \quad \text{con } Q = Q' > \phi \Rightarrow$$

$\textcircled{b} \min(\underline{z}' Q \underline{z}) = \underline{z} = \phi$

impiego: $\nabla_{\underline{z}} f(\underline{z}^0) = \phi \Rightarrow \underline{z}^0 = -Q^{-1} \underline{c}$

$$\nabla_{\underline{z}} = 2Q\underline{z} + 2\underline{c} \Rightarrow f(\underline{z}^0) = -\underline{c}' Q^{-1} \underline{c}$$

$$5) \underline{z}' Q_1 \underline{z} + \underline{z}' Q_2 \underline{z} = \underline{z}' (Q_1 + Q_2) \underline{z}$$

$$6) E(\underline{z}^2) = \underline{z}^2 + \text{VAR}(\underline{z}) \quad \text{dove } \hat{\underline{z}} = E(\underline{z})$$

$$\Rightarrow \text{VAR}(\underline{z}) = E(\underline{z} - \hat{\underline{z}})^2$$

$$7) E(\underline{z}' W \underline{z}) = \hat{\underline{z}}' W \hat{\underline{z}} + \text{Tr}(W \text{cov}(\underline{z}))$$

dove $\text{Tr}(A) = a_{11} + a_{22} + \dots + a_{nn} = \sum_{i=1}^n a_{ii}$

e $\text{Tr}(AB) = \text{Tr}(BA)$

$$8) \text{cov}(\underline{z}) = E \left[\begin{matrix} (\underline{z} - \hat{\underline{z}}) (\underline{z} - \hat{\underline{z}})' \\ \underline{z} \end{matrix} \right]$$