5 $T(n) = 2T(\frac{n}{2}) + \Theta(n^2) \rightarrow T(1) = \Theta(1)$

Metodo iterativo

$$T(n) = 2\left[2T(\frac{n}{2^2}) + \Theta(\frac{n^2}{2})\right] + \Theta(n^2)$$

$$T(n) = 2^K T(\frac{n}{2^K}) + \sum_{i=0}^{K-1} 2^i \Theta(\frac{n}{2^i})^2 \qquad K = \log(n)$$

$$T(n) = 2^{\log(n)}\Theta(1) + \Theta(n^2)\sum_{i=0}^{\log(n)-1}(\frac{1}{2})^i$$

$$T(n) = \Theta(n) + \Theta(n^2)\cdot 1$$

$$T(n) = \Theta(n^2)$$

Metodo principale

$f(n) = n^2 \qquad n^{\log_b a} = n^{\log_2 2} = n$

$f(n) = \Omega(n^{\log_b a})$ E $\Theta(\frac{n^2}{2}) \leq c \cdot \Theta(n^2)$

allora $T(n) = \Theta(n^2)$

metodo di sostituzione

$T(n) = 2T\left(\frac{n}{2}\right) + cn \qquad T(1) = d$

IPOTIZZO $T(n) = O(n^2) \rightarrow T(n) \leq kn^2$

C.B. $d \leq k$ I.I. $\forall n > m,\ T(n) \leq kn^2$

P.i

$T(n) \leq kn^2 \rightarrow 2T\left(\frac{n}{2}\right) + c \leq kn^2$

$2\left[k\left(\frac{n}{2}\right)^2\right] + c \leq kn^2 \rightarrow 2k\frac{n^2}{4} + c \leq kn^2$

$k\frac{n^2}{2} + c \leq kn^2 \qquad c \leq kn^2 - \frac{kn^2}{2}$

$c \leq \frac{kn^2}{2}$