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If the recurrence is of the form $T(n) = aT(\frac{n}{b}) + \Theta(n^k log^p n)$, where $a \geq 1, b > 1, k \geq 0$ and p is a real number, then:

1) If $a > b^k$, then $T(n) = \Theta(n^{log_b^a})$
2) If $a = b^k$
   a. If $p > -1$, then $T(n) = \Theta(n^{log_b^a} log^{p+1} n)$
   b. If $p = -1$, then $T(n) = \Theta(n^{log_b^a} loglogn)$
   c. If $p < -1$, then $T(n) = \Theta(n^{log_b^a})$
3) If $a < b^k$
   a. If $p \geq 0$, then $T(n) = \Theta(n^k log^p n)$
   b. If $p < 0$, then $T(n) = O(n^k)$

$\Theta(\underbrace{n^k \log^p n})$ | $\underbrace{n^2}$

$k = 2, p = 0$

$(a)^0 = 1$

Theorem ~~Formula~~

$T(n) = 3T(n/2) + n^2$

$a \times T(n/b)$ $\quad$ $3T(n/2)$

$a = 3, \; b = 2, \; k = 2$

Step1- Chk if MT can be applied/not

Step2- $a, b, k, p \to ??$

Step3- $a < b^k$

$3 < 2^2$

Step4- Condn 3rd

Step5- $p = 0$ (condition 3a)

Step6- $T(n) = \Theta(n^k \log^p n)$

$= \Theta(n^2 (\log n)^0)$

$= \Theta(n^2 . 1)$

$= \Theta(n^2)$.

$T(n) = 4T(n/2) + n^2$.