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

$T(n) = aT\left(\frac{n}{b}\right) + f(n),$

$$f(n) = \Theta(n^k \log^p n)$$

$a = 2$

$b = 2$

$k = 1$

$p = 0$

$\log_b^a = \log_2^2 = 1$

$k = \log_b^a$, $\underline{\underline{Case = 2}}$

$p = 0 \Rightarrow p > -1$

$\Rightarrow \Theta(n^k \log^{p+1} n)$

$= \Theta(n^1 \times \log^{0+1} n)$

$= \Theta(n \log(n))$

2) $T(n) = 2T(n/2) + n \log n$

$a = 2$

$b = 2$

$k = 1$

$P = 1$

$\log^a_b = 1$

$P = 1 , P > -1$

$= \Theta (n^k \log^{P+1} n)$

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

$=$

$=$

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

$a = 2$

$b = 2$

$k = 2$

$P = 0 , P \geqslant 0$

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

$= \Theta(n^2)$

195% + 1

log% < k

4) $T(n) = 8T(n/2) + n^2$

$a = 8$

$b = 2$

$k = 2$

$P = 0$

$\log_2 8 = 3$

$\log_2 8 > k$

$\Rightarrow \Theta(n^{\log_b a})$

$= \Theta(n^{\log_2 8})$

$= \Theta(n^3)$