

practice problem.

① $T(n) = 2T(n/2) + n$

① $a = 2$; $b = 2$, $k = 1$ $p = 0$

② $\log_b a \Rightarrow \log_2 2 \Rightarrow 1$

③ $\lceil \log_b a = k \rceil \Rightarrow 1 = 1$

where: $p > -1$

then $\boxed{\Theta(n \log n)}$

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

① $a = 2, b = 2, k = 1, p = 1$

② $\log_b a \Rightarrow \log_2 2 \Rightarrow 1$

③ Here $\log_b a = k$

$\boxed{1 = 1} \leftarrow \text{True.}$

so $p > -1$

$\Rightarrow \boxed{\Theta(n \log n \log n)}$

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

① $a = 2, b = 2, k = 2, p = 0$

② $\log_b a \Rightarrow 1$

③ $\log_b a < k$

$\boxed{1 < 2}$

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$$\Rightarrow \boxed{\Theta(n^2)}$$

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

① $a = 8$, $b = 2$, $k = 2$, $p = 0$

② $\log_b a \Rightarrow \log_2 2^3 \Rightarrow 3$

③ $\boxed{\log_b a > k} \Rightarrow 3 > 2$

$$\Rightarrow \boxed{\Theta(n^3)}$$