

* Master's Theorem Assignment Problem:-

1) $T(n) = 2T(n/2) + n$

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

① $a=2$ $k=1$

② $\log_b a = \log_2 2 = 1$

$b=2$ $p=0$

③ $\log_b a = k$ ($1=1$)

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

$p > -1$

$0 > -1$

$$\Rightarrow \Theta(n \log n)$$

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

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

① $a=2$ $k=1$

② $\log_b a = \log_2 2 = 1$

$b=2$ $p=1$

③ $\log_b a \neq k$

$p > -1$

$1 > -1$

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

$$\Rightarrow \Theta(n \log^2 n)$$

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

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

① $a=2$ $k=2$

② $\log_b a = \log_2 2 = 1$

$b=2$ $p=0$

③ $\log_b a < k$

$p \geq 0$

$$\Theta(n^k \log^p n) \Rightarrow \Theta(n^2 \log n)$$

$$4) \quad T(n) = 8T(n/2) + \underline{n^2}$$
$$\underline{f(n)} = \Theta(n^k \log^p n)$$

$$\textcircled{1} \quad a = 8$$

$$k = 2$$

$$\textcircled{2} \quad \log_b a = \log_2 8 = 3$$

$$b = 2$$

$$p = 0$$

$$\textcircled{3} \quad \log_b a > k$$

$$3 > 2$$

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

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