Assignment - 4

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

A) $T(n) = aT(n/b) + F(n)$

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

$a = 2 \quad k = 1$

$b = 2 \quad p = 0$

$\log_b^a = 1$

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

$k = 1$

$\log_b^a = k$

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

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

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

$a = 2 \quad k = 1$

$b = 2 \quad p = 1$

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

$\log_b^a = k$

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

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

3) $T(n)$

$a = 2$

$b =$

$\log$

p

4) T

a

b

=

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

$a = 2$ $\quad K = 2$

$b = 2$ $\quad P = 0$

$\log_b^a < K$

$\log_2^2 = 1$

$P > 0 \Rightarrow O(n^K \log^P n)$

$\Rightarrow O(n^2)$ //

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

$a = 8$ $\quad K = 2$

$b = 2$ $\quad P = 0$

$\Rightarrow \log_2^8 = \log_2^{2^3}$

$\Rightarrow 3 \log_2^2$

$= 3$

$\log_b^a = 3$ $\quad K = 2$ $\quad \log_b^a > K$

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

$\Rightarrow O(n^3)$ //