Assignment 4

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

4) $T(n) = 8T(\frac{n}{2}) + n^2$

using master's theorem

$a = 8, b = 2, k = 2, p = 0$

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

~~$\log_b^a < k \Rightarrow 3 < 2$, $p \geq 0$~~

~~case 3a)~~

~~$= \theta(n^k \log^{p+1} n)$~~

~~$= \theta(n^2 \log n)$~~

$\log_b^a > k \Rightarrow 3 > 2$

case 1 $\Rightarrow \theta(n^{\log_b^a})$

$\boxed{\theta(n^3)}$

Assignment 4

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

master's theorem

$T(n) = aT(n/b) + f(n) \Rightarrow (n^k \log^p n)$

$a=2, b=2, k=1, p=0$

$\log_b^a = k \Rightarrow \log_2^2 = 1 \Rightarrow$ valid case 2

$p=0, \quad p > -1 \rightarrow \theta(n^{k} \log^{p+1} n)$

$\theta(n \log n)$

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

using master's theorem

$T(n) = a(T(n/b) + (n^k \log^p n)$

$a=2, b=2, k=1, p=1$

case 2 $\Rightarrow \log_b^a = k$

$p=1, p > -1 \rightarrow \theta(n^k \log^{p+1} n)$

$= \theta(n \log^2 n)$

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

$a=2, b=2, k=2,$ case 3 $\Rightarrow \log_b^a < k$

$p \geq 0 = \theta(n^k \log^p n) \Rightarrow \theta(n^2 \log^0 n)$

$\theta(n^2)$

4) $T(n) = 8T(n/2) + n^2 \rightarrow a=8, b=2, k=2$