

p4.2

$$a) T(n) = 36 T(n/6) + 2n$$

Master method:

$$\cancel{a=36} \quad a=36$$

$$b=6$$

$$n^{\log_6 36} = n^2$$

$$f(n) = 2n$$

$$f(n) = O(n^{2-\epsilon}) \text{ where } \epsilon = 1, \text{ so}$$

$$T(n) = \Theta(n^2)$$

$$b) T(n) = 5 T(n/3) + 17n^{1.2}$$

Master method:

$$a=5$$

$$b=3$$

$$n^{\log_3 5} = n^{1.46}$$

$$f(n) = 17n^{1.2}$$

$$f(n) = O(n^{1.46-\epsilon}) \text{ where } \epsilon = 0.26,$$

$$T(n) = \Theta(n^{1.46})$$

$$c) T(n) = 12T(n/2) + n^2 \log n$$

Master meth.

$$a = 12$$

$$b = 2$$

$$n^{\log_2 12} = n^{3.58}$$

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

$$f(n) = O(n^{3.58-\epsilon}) \text{ where } \epsilon \in \mathbb{R}$$

As

$$n^{3.58} > n^2 \text{ and } O(n) > O(\log n),$$

$f(n)$ is asymptotically and polynomially smaller

than $n^{3.58}$

$$T(n) = \Theta(n^{3.58})$$