Week 4

4.2

a)

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

Master

$a = 36 \quad b = 6 \quad n^{\log_6 36} = n^2, \quad f(n) = \Theta(n)$

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

b)

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

$a = 5 \quad b = 3 \quad n^{\log_3 5} \quad f(n) = \Theta(n^{1.2})$

$\log_3 5 < 1.2 \quad \therefore \quad T(n) \in \Theta(n^{1.2})$

c)

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

$a = 12 \quad b = 2 \quad n^{\log_2 12} > n^3 \quad n^{\log_2 12} < n^4$

$f(n) = \Theta(n^2) \quad \therefore \quad T(n) \in \Theta(n^2 \log n)$

$f(n) < n^{\log_2 12}$

d)

assuming $T(n/3) \approx T(n/2)$ as $n \to \infty$

$T(n) = 4T(n/3) + 2^n$

$a = 4 \quad b = 3 \quad n^{\log_3 4} \quad f(n) = 2^n$

$\therefore T(n) \in \Theta(n^{\log_3 4})$

e)

$T(n) = T(2n/5) + T(3n/5) + \Theta(n)$

assuming $T(2n/5) \approx T(3n/5)$ as $n \to \infty$

$\therefore T(n) = 2T(3n/5) + \Theta(n)$

$a = 2 \quad b = 5$

$n^{\log_5 2} > n \quad \therefore T(n) \in \Theta(n^{\log_5 2})$