Question 4

Q4. Master Theorem

i) $T(n) = 7T(n/b) + n^2$

From this $a = 7$, $b = 2$ and

Comparing this to the original form of $T(n) = aT(n/b) + O(n^d)$

we can see that

$a = 7$, $b = 2$ and $d = 2$.

Find $\log_b^d = \log_2^7 = 2.80$

Since $\log_b^a > 2$

The order of computation will be

$O(n \log_2^7)$

ii) $T(n) = 5T(n/3) + O(n)$

Comparing this to the original form:

$T(n) = aT(n/b) + O(n^d)$

$\therefore a = 5$, $b = 3$, $d = 1$

Finding $\log_b^a$

$\Rightarrow \log_3^5 = 1.464$

Since

$\log_b^a > d$

The order of computation will be:

$O(n \log_3^5)$

) $T(n) = 3T(n/2) + 3/4\,n + 1$

Comparing this to this:

$T(n) = aT(n/b) + O(n^d)$

we can say that

$a = 3$, $b = 2$ and $d = 1$

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$\log_b^a = \log_2^3 = 1.59$.

How since $\log_b^a > d$

$\log_2^3 > 1$

∴ The order of computation will be:

$O(n \log_2^3)$