

**Computer Science COMP3600/COMP6466 –
Tutorial One**

Question 1.

(i) Review the definitions of the basic notations such as Θ , O , Ω , o , ω .

(ii) Rank the following functions in the order of growth:

$n^2 \lg n$, $n^{3/2} \lg^4 n$, $3^{0.5n}$, $\lg^* n \lg^2 n$, $n^{1.44}$, $\sqrt{n^{1/3} \lg n}$, $n^{\lg \lg n}$, \sqrt{n} , n^5 .

Question 2.

Review the various techniques for bounding summations. Estimate these using the $\Theta()$ notation:

$$\sum_{k=1}^n \frac{k^2}{7^k}, \quad \sum_{k=2}^n \frac{k^{1/2}}{\lg k}, \quad \sum_{k=1}^n k^{7/2}$$

Question 3. Review the three approaches for solving recurrences, and apply them to solve the following recurrences.

- (a) $T(n) = T(n/3) + n^{5/4}$.
- (b) $T(n) = 3T(n/2) + 4n$.
- (c) $T(n) = T(\lfloor \sqrt{n} \rfloor) + n \log n$.

Question 4. In the linear-time selection algorithm, the elements in the input sequence are divided into groups of size 5. Does the algorithm still run in linear time if the input elements are divided into groups of size 17 instead?