**Solutions For Homework – 1**

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1. In each of the following situations, indicate whether f = O(g), or f = Ω(g) or both (in which case f = θ(g))

f(n) g(n)

(a) n-100 n-200

(b) 100n+logn n+ (logn)2

(c) n logn 10n log 10n

(d) 10 log n log(n)2

(e) n1.01 n log2 n

(f) n2/logn n(logn)2

(g) n2n 3n

(h) 2n 2n+1

(i) n! 2n

Ans.)

1. As, n-100 >= n-200 🡪 f = θ(g) (since both are O(n)).
2. As, 100n+logn >= n+ (logn)2 🡪 f = θ(g) (since both are O(n)).
3. As, n logn >= 10n log 10n 🡪 f = θ(g) (since both are O(n logn)).
4. As, 10 log n >= log(n)2 🡪 f = θ(g) (since both are O(logn)).
5. As, n1.01 > n log2 n 🡪 f = Ω(g).
6. As, n2/logn > n(logn)2 🡪 f = Ω(g).
7. As, n2n < 3n 🡪 f = O(g).
8. As, 2n >= 2n+1 🡪 f = θ(g).
9. As, n! > 2n 🡪 f = Ω(g).

2.) Arrange the following functions in the increasing order of the complexity.

1) f1(n) = 2n

2) f2(n) = n3/2

3) f3(n) = nlogn

4) f4(n) = nlogn

Ans.) nlogn < n3/2 < nlogn < 2n. (Increasing order of the complexity)

f3 < f2 < f4 < f1.