Assignment - 2

1) $F(n) = n-10 \quad G(n) = n+10$

$F(n) = \Theta(g(n))$

$F(n) \leq c \cdot g(n) \Rightarrow O$

$n-10 \leq c \cdot n+10$

If $c=1$

$n-10 \leq 1 \cdot n+10$ (T)

$F(n) = O(g(n))$

$F(n) \geq c \cdot g(n) \Rightarrow \Omega$

$n-10 \geq c \cdot n+10$

If $c = 1/2$

$n-10 \geq \frac{1}{2} \cdot n+10$ (T)

$F(n) = \Omega(g(n))$

Both the conditions are True

$F(n) = \Theta(g(n))$

2) $F(n) = n \quad g(n) = n$

$F(n) = \Theta(g(n))$

$F(n) \leq c \cdot g(n)$

$n \leq c \cdot n$

If $c=1$

$F(n) = O(g(n))$ (T)

$F(n) \geq c \cdot g(n)$

$n \geq c \cdot n$

If $c=1$

$F(n) = \Omega(g(n))$

Since the both conditions are True

$F(n) = \Theta(g(n))$

3) Cl

4)

3) $64^{\log_2 n} \cdot 32^{\log_2 n} = O(n^5)$

$$a^{\log_a^p} = p$$

$$p^{\log_a^\alpha} = p$$

$$n^{\log_2^{64}} \cdot n^{\log_2^{32}} = O(n^5)$$

$$n^{\log_2^{2^6}} \cdot n^{\log_2^{2^5}} = O(n^5)$$

$$n^6 \cdot n^5 \leq c n^5$$

If $c = n^6$ But c is not constant

Not a valid Big O

4) $\frac{4^n}{2^n} = O(2^n)$

$$\frac{2^n \cdot 2^n}{2^n} = O(2^n)$$

$$2^n \leq c \cdot 2^n \Rightarrow (T)$$

If $c = 1$

Valid Big O

5) $128^{\log_2 n} \cdot n^2 = O(n^9)$

$n^{\log_2 2^7} \cdot n^2 = O(n^9)$

$n^7 \cdot n^2 = O(n^9)$

Big O

$n^9 \leq c \cdot n^9$

If $c = 1$

$n^9 \leq 1 \cdot n^9$

(True)

Omega (Ω)

$n^9 \geq c \cdot n^9$

If $c = 1$

$n^9 \geq 1 \cdot n^9$

(True)

Valid (Θ)