# Topics to discuss

1. Big Omega Notation ($\Omega$-notation)

2. Examples

# Omega - $\Omega$ Notation

This notation gives the tighter lower bound of the given algorithm and we represent it as $f(n) = \Omega(g(n))$.
At larger values of $n$, the tighter lower bound of $f(n)$ is $g(n)$.

## Definition :

The $\Omega$ notation can be defined as $\Omega(g(n)) = \{ f(n) :$ there exist positive constants $c$ and $n_0$ such that $0 \le c\,g(n) \le f(n)$ for all $n \ge n_0 \}$.

$g(n)$ is an asymptotic tight lower bound for $f(n)$.

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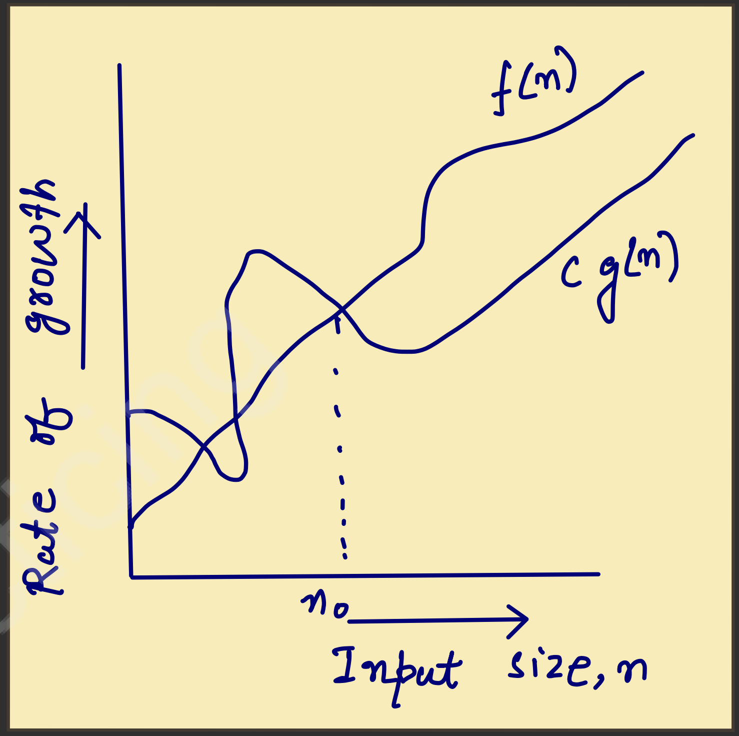

1. Find the lower bound for $f(n) = 5n^2 - 1$

Solution: Given, $f(n) = 5n^2 - 1$

By definition, $0 \le c.g(n) \le f(n)$.

$$c.g(n) \le f(n)$$

$$4n^2 \le 5n^2 - 1$$

$c = 4$

$g(n) = n^2$

$$4n^2 - 5n^2 \le -1$$

$$-n^2 \le -1$$

$$n \ge 1$$

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

$f(n) = \Omega(n^2)$

$c = 4, \ n \ge 1, \ n_0 = 1$

② Prove $f(n) = 100n + 5 \neq \Omega(n^2)$.

Solution :- $f(n) = 100n+5$

By definition, $0 \leq c \cdot g(n) \leq f(n)$

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

$n^2 \leq 100n+5$ (Given, $g(n) = n^2$)

(False).

So, $f(n) = \Omega(n^2)$ is not true.

**Follow Now**

Start Practicing

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