# Time Complexity Analysis.

Q:

```
a = 1
b = 1
while( b < n)
{
    a += 1;
    b += a;
    cout << "Hi";
}
```

| a | b |
|---|---|
| 1 | 1 |
| 2 | 1+1 = 2 |
| 3 | 2+2 |
| 4 | 2+2+3 |
| 5 | 2+2+3+4 |
| 6 | 2+2+3+4+5 |
| ⋮ | ⋮ |
| z | (2)+2+3+4+5+...+z |

→ If first term becomes 1 then it will become sum of z numbers.

$\Rightarrow b = 1+2+3+4+..+z = \frac{z(z+1)}{2}$

$b < n$

→ $b \geq n \Rightarrow \frac{z(z+1)}{2} \geq n \Rightarrow z^2 \geq n \Rightarrow z = \sqrt{n}$

→ **Time Complexity, $T(n) = O(\sqrt{n})$**