

i) Find the time complexity for following scenarios

a) for ($i=1; i \leq n; i++$) $\rightarrow n$ times

for ($j=i; j \leq n; j++$) $\rightarrow n$ times

print("Hi")

Time complexity = $O(n^2)$

i	j
1	1
2	2
3	3
\vdots	\vdots
n	n

} n times.

b) for ($i=1; i \leq n; i *= 3$) $\rightarrow \log_3 n$

for ($j=1; j \leq n; j++$) $\rightarrow n$ times.

print("Hello")

i

$$1 \times 3 = 3$$

$$3^1 \times 3 = 6$$

$$3^2 \times 3 = 9$$

$$3^3 \times 3 = 3^4$$

\vdots

3^k ; Assume $i \geq n$,

$$i = 3^k$$

$$3^k \geq n$$

$$3^k = n$$

$$k = \log_3 n$$

Time complexity = $n \times \log_3 n$
 $= (n \log_3 n)$