

Time & Space Complexity (Assignment Solutions)

Solution :

- a. Option A -> Time complexity = $O(n \cdot \log n)$

In the loop, j keeps doubling till it is less than or equal to n. Several times, we can double a number till it is less than n would be $\log(n)$.

Let's take the examples here.

for $n = 16$, $j = 2, 4, 8, 16$

for $n = 32$, $j = 2, 4, 8, 16, 32$

So, j would run for $O(\log n)$ steps.

i runs for $n/2$ steps.

So, total steps = $O(n/2 \cdot \log(n)) = O(n \cdot \log n)$

- b. Option C -> Time complexity = $O(\log kn)$

Because loops for the $kn-1$ times, so after taking log it becomes $\log kn$.

- c. Option B. -> false

The Big-O notation provides an asymptotic comparison in the running time of algorithms. For $n < n_0$, algorithm A might run faster than algorithm B, for instance.

- d. Time complexity - $O(\sqrt{n})$ //square root of n
Space complexity - $O(1)$

- e. Time complexity - $O(n^2)$
Space complexity - $O(1)$