

## 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.  
 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 -  $O(1)$