

20.22. WHEN TWO NESTED FOR LOOP $\neq O(n^2)$

HERE ARE SOME EXAMPLES WHEN SINGLE FOR LOOP
 $\neq O(n^2)$

1. LET'S SAY FOR LOOP NOT RUNNING AT N
TIMES BUT AT AMOUNT OF CONSTANT TIME.

```
for(i = 1, i ≤ n; i++) {  
    for(i = 1, i ≤ 2; i++) {  
  
        k = k + 1;  
  
    }  
}
```

SOLUTION

It will result $O(n)$ complexity as inner loop runs constant amount of time, we can tell it gives $2n$ iterations,

hence $O(2n) = O(n)$.

2. LET'S SAY FOR LOOP'S UPPER BOUND GETS INCREASED.

```
for( $i = 1, i \leq n; i++$ ){  
    for( $i = 1, i \leq n^2; i++$ ){  
  
         $k = k + 1;$   
    }  
}
```

SOLUTION

Therefore, it will run n^2 times $n = n^3$ gives $O(n^3)$ complexity.

HENCE IT IS PROVED THAT TWO NESTED FOR LOOP DOES NOT ALWAYS GIVES COMPLEXITY $O(n^2)$.