

## Question

Select all that are correct. Selecting a wrong answer cancels one correct choice.

Note: ^ is the power operator.

☐

$$10000N^3 + 2N^4 = O(N^3)$$

☐

$$50N^2 + N^2 \log N = O(N^2)$$

☒

$$\log N^4 = O(\log N)$$

☐

$$9000010 + N = O(1)$$

☒

$$1 + 2 + 3 + 4 + \dots + N = O(N^2)$$

☐

$$N + N^2 + N^3 + \dots + N^9 + N^{10} = O(N^{11})$$

☐

$$N^2 \log N^2 = O(N^2)$$

☐

$$1 + 2 + 3 + \dots + N + N \log N = O(N \log N)$$

☒

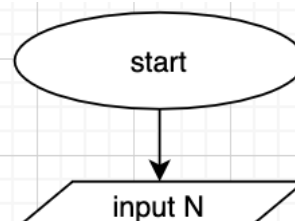
$$\log N/2 + \log N/3 + \log N/4 + \dots + \log N/10 = O(\log N)$$

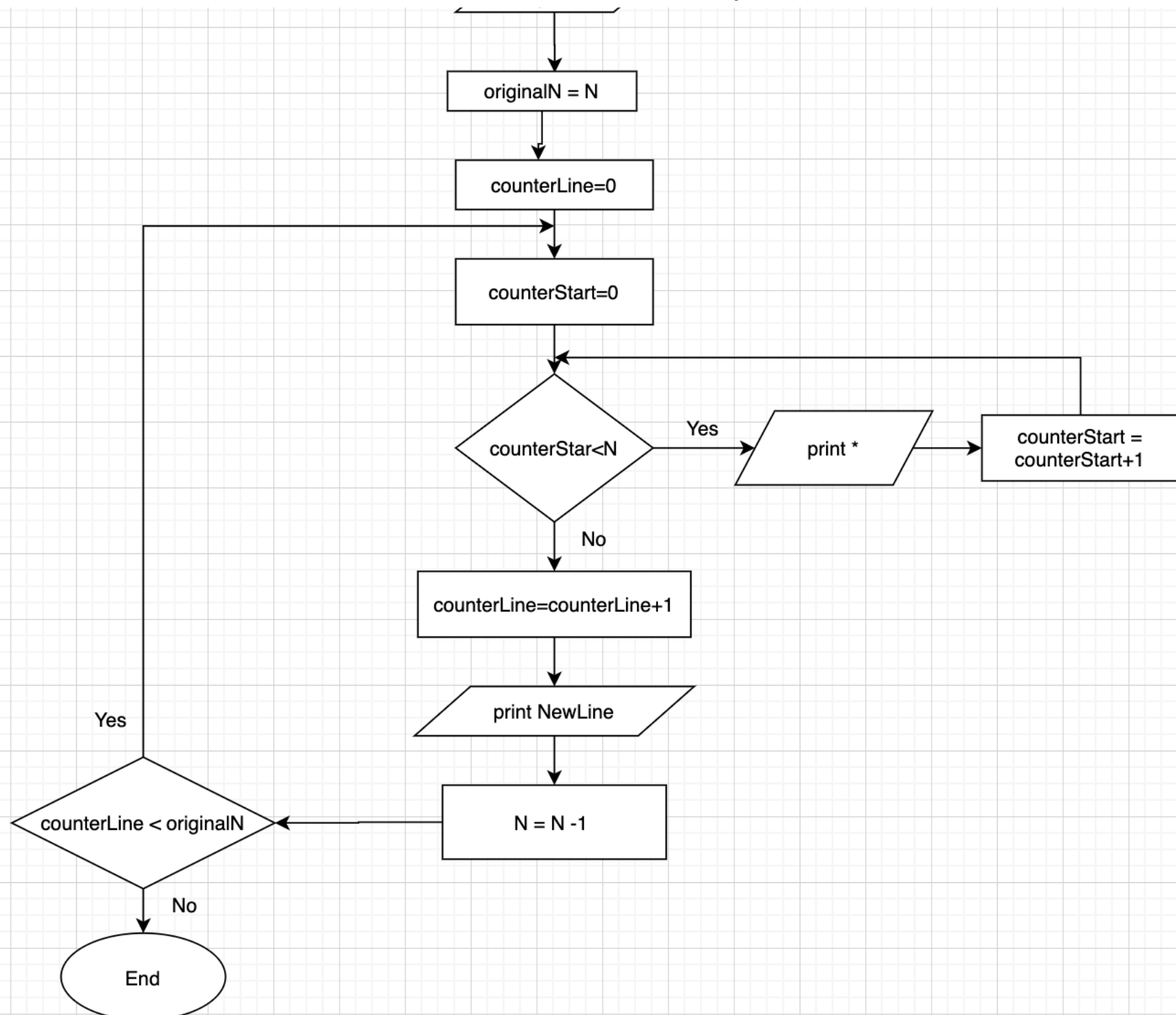
☒

$$N/2 + N/3 + N/4 + N/5 = O(N)$$

## Question

What is the time complexity order of the following flowchart?







$O(N^2)$



$O(N)$



$O(N \log N)$



$O(\log N)$

## Question

Which one has the constant ( $O(1)$ ) time complexity order?



Adding an item to the beginning of a sorted list



Adding an item to the set



Checking whether a key is in the dictionary or not



Checking whether a given list is sorted or not.



Inserting an item to any index in the list.



removing an item from the end of the list



removing an item from the set



removing an item from the beginning of the list.



creating an empty set and initialize of with a list of size  $N$



searching for an item in a sorted list.

### Question

What is the time Complexity order of the following?

```
N = int(input("enter a number"))
M = int(input("enter a number"))

a = 0, b = 0;
for i in range(N):
    a = a + i

for j in range(M):
    b = b + j
```



$O(a+b)$



$O(N+M)$



$O(N)$



$O(M)$

### Question

What is the time complexity order of the following code:

```
N = int(input("enter a number"))
a = 3
for i in range(N):
    for j in range (N, i, -1):
        a = a ** 2
```

- ☐
- ☐  $O(N)$
- ☐
- ☐  $O(N \log N)$
- ☐
- ☐  $O(N^2 \log N)$
- ☒  $O(N^2)$

### Question

Suppose for a specific problem you have designed two algorithms: AlgorithmX and AlgorithmY and you have done some complexity analysis and figured out that the AlgorithmX is asymptotically better than Algorithm Y. What this one?

- ☐
- ☐ AlgorithmX is always better than AlgorithmY
- ☐
- ☐ AlgorithmY is always better than AlgorithmX
- ☒
- ☐ AlgorithmX is always better than AlgorithmY for the same problem with big enough input sizes.
- ☐
- ☐ AlgorithmX is always better than AlgorithmY for the same problem with small enough input sizes.

### Question

Consider the following scenario and decide what algorithms would you use in this scenario. Suppose, there is a list of numbers (not sorted) and we want to search for an item (a number) in the list.

Scenario: If the size of the list is 10 (there are only 10 numbers in the list) and we want to search for a number only once then what algorithms would you use?



Linear Search



Merge Sort



Binary Search



Merge Sort

### Question

Consider the following scenario and decide what algorithms would you use in the scenario. Suppose, there is a list of numbers (not sorted) and we want to search for an item (a number) in the list.

Scenario: If the size of the list is 150 (there are 150 numbers in the list) and we want to search for a number only once then what algorithms (merge sort, selection sort, linear search, binary search, combinations of these, ...) would you use?



Merge Sort



Binary Sort



Linear Search



Binary Search

### Question

Consider the following scenario and decide what algorithms would you use in this scenario.

Suppose, there is a list of numbers (not sorted) and we want to search for an item (a number) in the list.

Scenario3: If the size of the list is 150 (there are 150 numbers in the list) and we want to search for a number 10 times. (running the search algorithm 10 times) then what algorithms would you use?

☐

Linear Search

☒

Binary Search

☐

Merge Sort

☐

Insertion Sort

### Question

Imagine you have an english dictionary of english words. The words are sorted alphabetically and the dictionary is 1000 pages. Imagine the dictionary does not have labels/indexes and you do not know how many words starting with each alphabets are available in the dictionary. Now let's imagine you are looking for a specific word and you would like to find the word and its corresponding meaning in the dictionary. In worst case, scenario how many pages of this dictionary are you going to visit to find the desired word. (Suppose you have designed an efficient algorithms already for this problem.)

☐

1000

☐

500

☐

1

☒

12

### Question

What would be one line of code you can add to this code to get it to work. First guess what it does and then add one line of code. Write your line of code in the designated area.

```
def test(num):  
    result = 0  
  
    if #Add a line of code here  
        return result  
    else:  
        a = num%10  
  
    result = a + test(num//10)  
    return result
```

Answer

Submit