

Day – 11 Binary Search

Problem Statement: Given two numbers N and M, find the Nth root of M.

The nth root of a number M is defined as a number X when raised to the power N equals M.

```
def find_nth_root(N, M):
```

```
    X = M ** (1/N)
```

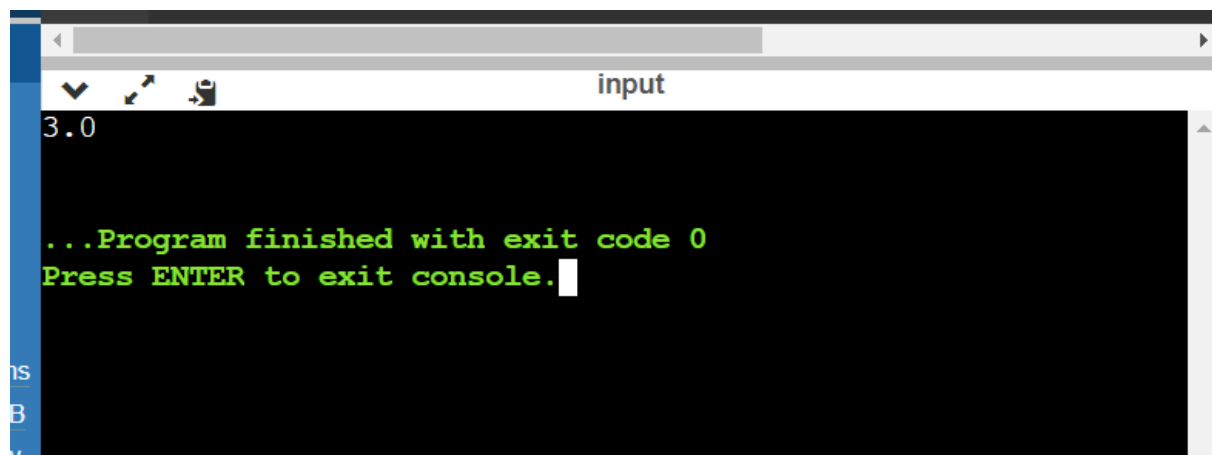
```
    return X
```

```
N = 3
```

```
M = 27
```

```
result = find_nth_root(N, M)
```

```
print(result)
```

A screenshot of a terminal window with a black background and green text. The window title is 'input'. The output shows '3.0' on the first line, followed by '...Program finished with exit code 0' and 'Press ENTER to exit console.' on the next two lines. The cursor is at the end of the third line.

```
3.0

...Program finished with exit code 0
Press ENTER to exit console.
```

Problem Statement: Given a row-wise sorted matrix of size $r \times c$, where r is no. of rows and c is no. of columns, find the median in the given matrix.

```
def find_median(matrix):
```

```
    rows, cols = len(matrix), len(matrix[0])
```

```
    arr = []
```

```

for i in range(rows):
    for j in range(cols):
        arr.append(matrix[i][j])

arr.sort()

middle_idx = len(arr) // 2
median = arr[middle_idx]

return median

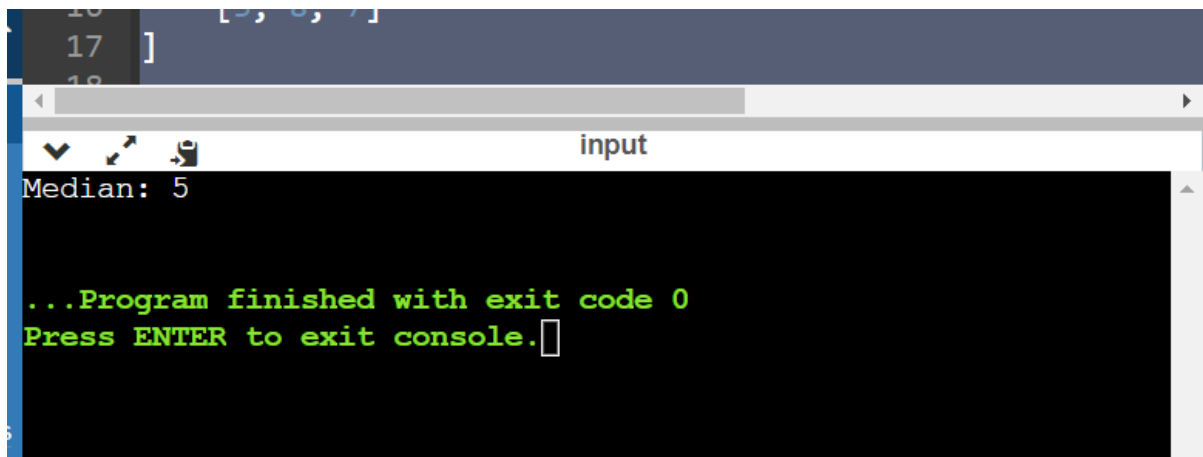
matrix = [
    [1, 4, 9],
    [2, 5, 6],
    [3, 8, 7]
]

```

```

median = find_median(matrix)
print("Median:", median)

```



The screenshot shows a code editor with the following code:

```

16     [3, 8, 7]
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```

The console output shows:

```

input
Median: 5

...Program finished with exit code 0
Press ENTER to exit console.

```

Problem Statement: Given a sorted array of N integers, where every element except one appears exactly twice and one element appears only once. Search Single Element in a sorted array.

```

def find_single_element(arr):
    left, right = 0, len(arr) - 1

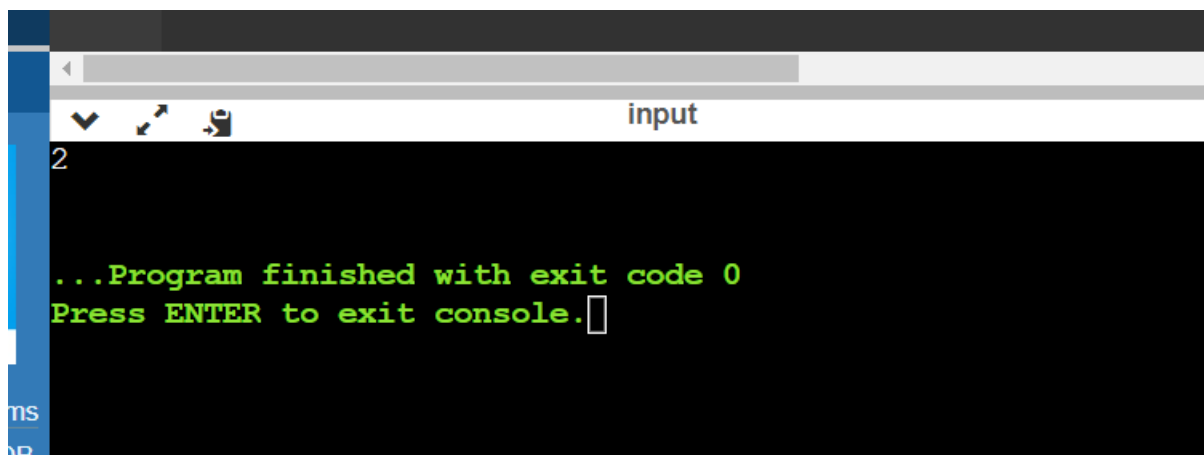
```

```

while left < right:
    mid = left + (right - left) // 2
    if mid % 2 == 1:
        mid -= 1

    if arr[mid] == arr[mid + 1]:
        left = mid + 2
    else:
        right = mid
return arr[left]
arr = [1, 1, 2, 3, 3, 4, 4, 8, 8]
print(find_single_element(arr))

```



```

input
2
...Program finished with exit code 0
Press ENTER to exit console.

```

Problem Statement: Given an integer array `arr` of size `N`, sorted in ascending order (with distinct values) and a target value `k`. Now the array is rotated at some pivot point unknown to you. Find the index at which `k` is present and if `k` is not present return `-1`.

```

def find_target_index(arr, k):
    low, high = 0, len(arr) - 1

    while low <= high:
        mid = (low + high) // 2

```

```

if arr[mid] == k:
    return mid

if arr[low] <= arr[mid]:
    if arr[low] <= k <= arr[mid]:
        high = mid - 1
    else:
        low = mid + 1
else:
    if arr[mid] <= k <= arr[high]:
        low = mid + 1
    else:
        high = mid - 1

return -1

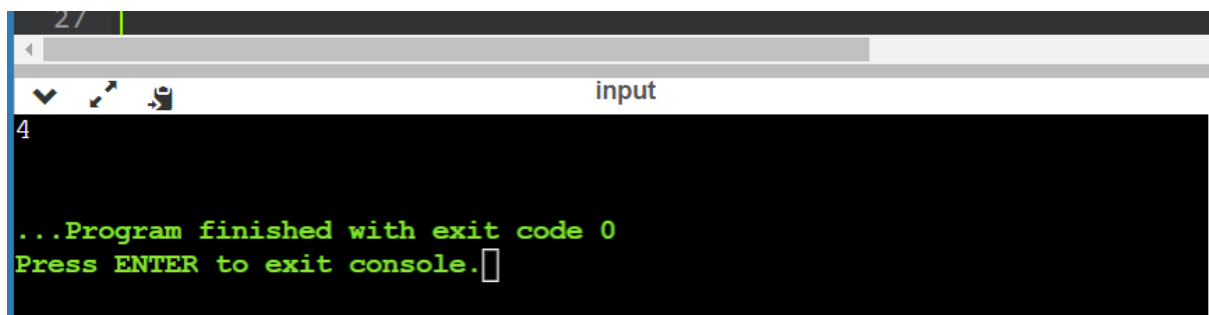
arr = [4, 5, 6, 7, 0, 1, 2, 3]
k = 0

```

```

index = find_target_index(arr, k)
print(index)

```



```

27 |
input
4
...Program finished with exit code 0
Press ENTER to exit console.

```

Problem Statement: Given **two sorted arrays** arr1 and arr2 of size m and n respectively, return the **median** of the two sorted arrays.

```

def findMedianSortedArrays(arr1, arr2):

```

```
merged = []  
  
i, j = 0, 0  
  
while i < len(arr1) and j < len(arr2):  
    if arr1[i] <= arr2[j]:  
        merged.append(arr1[i])  
        i += 1  
    else:  
        merged.append(arr2[j])  
        j += 1  
  
while i < len(arr1):  
    merged.append(arr1[i])  
    i += 1  
  
while j < len(arr2):  
    merged.append(arr2[j])  
    j += 1  
  
length = len(merged)  
  
if length % 2 == 0:  
    mid1 = length // 2  
    mid2 = mid1 - 1  
    median = (merged[mid1] + merged[mid2]) / 2  
else:  
    mid = (length - 1) // 2
```

```
median = merged[mid]
```

```
return median
```

```
arr1 = [1, 4, 7, 10, 12]
```

```
arr2 = [2, 3, 6, 15]
```

```
median = findMedianSortedArrays(arr1, arr2)
```

```
print(median)
```

Problem Statement: Given **two sorted arrays** of size **m** and **n** respectively, you are tasked with finding the element that would be at the **kth position** of the **final sorted array**.

```
def find_kth_element(array1, array2, k):
```

```
    m, n = len(array1), len(array2)
```

```
    i, j = 0, 0
```

```
    count = 0
```

```
    while i < m and j < n:
```

```
        if array1[i] <= array2[j]:
```

```
            current_element = array1[i]
```

```
            i += 1
```

else:

 current_element = array2[j]

 j += 1

count += 1

if count == k:

 return current_element

while i < m:

 count += 1

 if count == k:

 return array1[i]

 i += 1

while j < n:

 count += 1

 if count == k:

 return array2[j]

 j += 1

return "Error: k exceeds the total number of elements."

array1 = [2, 3, 6, 7, 9]

array2 = [1, 4, 8, 10]

k = 5

result = find_kth_element(array1, array2, k)

print(result)

```
36 print(result)
37
```

input

6

...Program finished with exit code 0
Press ENTER to exit console.