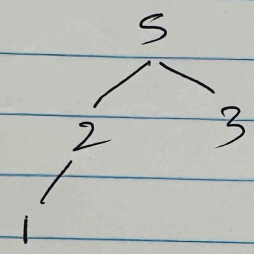
Week9-Q2

5 2 3 1

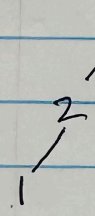
Max Heap



After max heap arr = [5, 2, 3, 1]

Solution

Replace 5 with 3 and 5 goes to end position in array



arr = [, , , 5]

Replace 3 with 2 & 3, it goes to second last

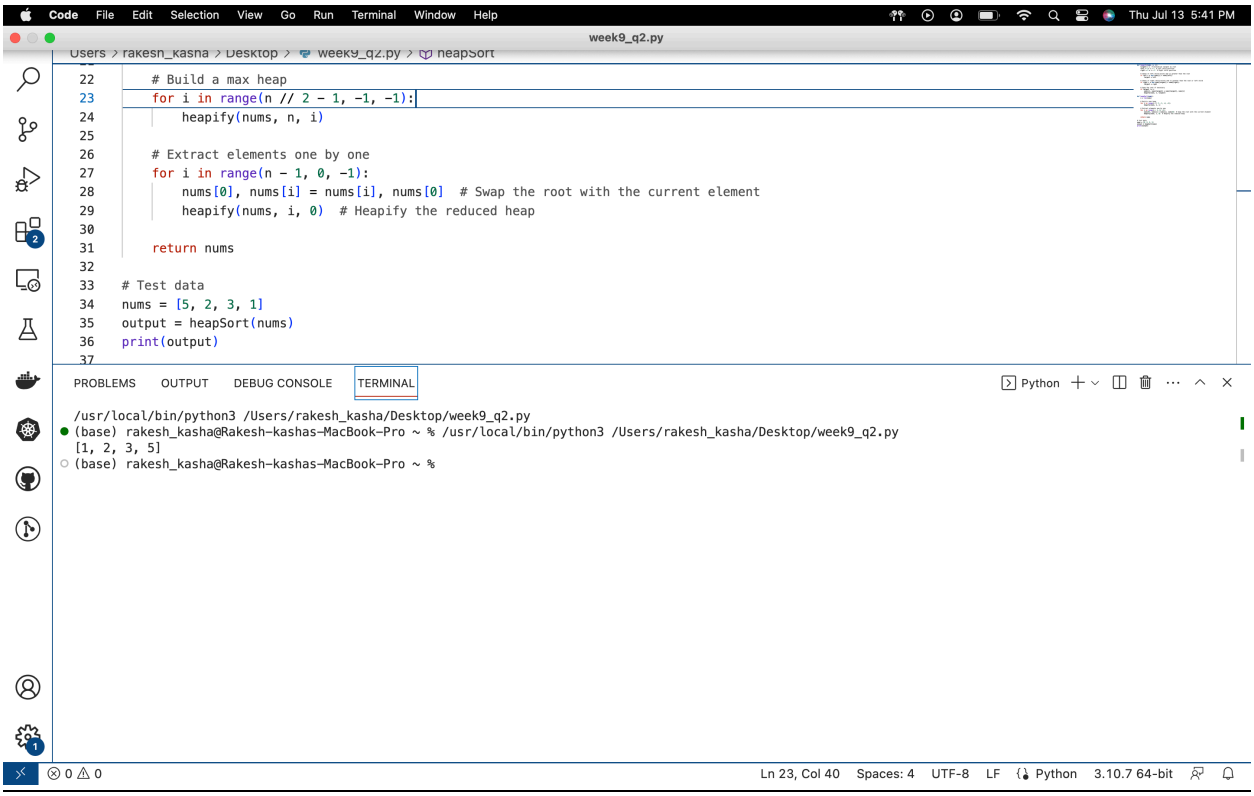
arr = [, 3, 5]

2 is in root position

arr = [, 2, 3, 5]

=> [1, 2, 3, 5].

```python
def heapify(nums, n, i):
    largest = i  # Initialize largest as root
    left = 2 * i + 1  # Left child position
    right = 2 * i + 2  # Right child position

    # Check if left child exists and is greater than the root
    if left < n and nums[i] < nums[left]:
        largest = left

    # Check if right child exists and is greater than the root or left child
    if right < n and nums[largest] < nums[right]:
        largest = right

    # Swap the root if necessary
    if largest != i:
        nums[i], nums[largest] = nums[largest], nums[i]
        heapify(nums, n, largest)

def heapSort(nums):
    n = len(nums)

    # Build a max heap
    for i in range(n // 2 - 1, -1, -1):
        heapify(nums, n, i)

    # Extract elements one by one
    for i in range(n - 1, 0, -1):
        nums[0], nums[i] = nums[i], nums[0]  # Swap the root with the current element
        heapify(nums, i, 0)  # Heapify the reduced heap

    return nums

# Test data
nums = [5, 2, 3, 1]
output = heapSort(nums)
print(output)
```


Code File Edit Selection View Go Run Terminal Window Help
Thu Jul 13 5:41 PM
week9_q2.py
Users › rakesh_kasha › Desktop › week9_q2.py › heapSort
# Build a max heap
for i in range(n // 2 - 1, -1, -1):
heapify(nums, n, i)
# Extract elements one by one
for i in range(n - 1, 0, -1):
nums[0], nums[i] = nums[i], nums[0] # Swap the root with the current element
heapify(nums, i, 0) # Heapify the reduced heap
return nums
# Test data
nums = [5, 2, 3, 1]
output = heapSort(nums)
print(output)
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
Python
/usr/local/bin/python3 /Users/rakesh_kasha/Desktop/week9_q2.py
(base) rakesh_kasha@Rakesh-kashas-MacBook-Pro ~ % /usr/local/bin/python3 /Users/rakesh_kasha/Desktop/week9_q2.py
[1, 2, 3, 5]
(base) rakesh_kasha@Rakesh-kashas-MacBook-Pro ~ %
0 0
Ln 23, Col 40
Spaces: 4
UTF-8
LF
Python
3.10.7 64-bit