

**29. Given an array of points where  $\text{points}[i] = [x_i, y_i]$  represents a point on the X-Y plane and an integer  $k$ , return the  $k$  closest points to the origin  $(0, 0)$ . The distance between two points on the X-Y plane is the Euclidean distance (i.e.,  $\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$ ). You may return the answer in any order. The answer is guaranteed to be unique (except for the order that it is in).**

**PROGRAM:**

```
import heapq

def kClosest(points, k):
    heap = []
    for x, y in points:
        dist = -(x*x + y*y)
        if len(heap) == k:
            heapq.heappushpop(heap, (dist, x, y))
        else:
            heapq.heappush(heap, (dist, x, y))
    return [(x, y) for (dist, x, y) in heap]

points = [[1, 3], [-2, 2], [5, 8], [0, 1]]
k = 6
print(kClosest(points, k))
```

**OUTPUT:**

```
PS C:\Users\chall\OneDrive\Desktop\DAA> & C:/Users/chall/AppData/Local/Programs/Python/Python312/python.exe
"
[(5, 8), (-2, 2), (1, 3), (0, 1)]
PS C:\Users\chall\OneDrive\Desktop\DAA>
```

**TIME COMPLEXITY:**

Time complexity for the above code is  $O(n \log k)$