Shri Vile Parle Kelavani Mandal's
DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING
(Autonomous College Affiliated to the University of Mumbai)
NAAC Accredited with "A" Grade (CGPA : 3.18)

Academic Year: 2022-2023

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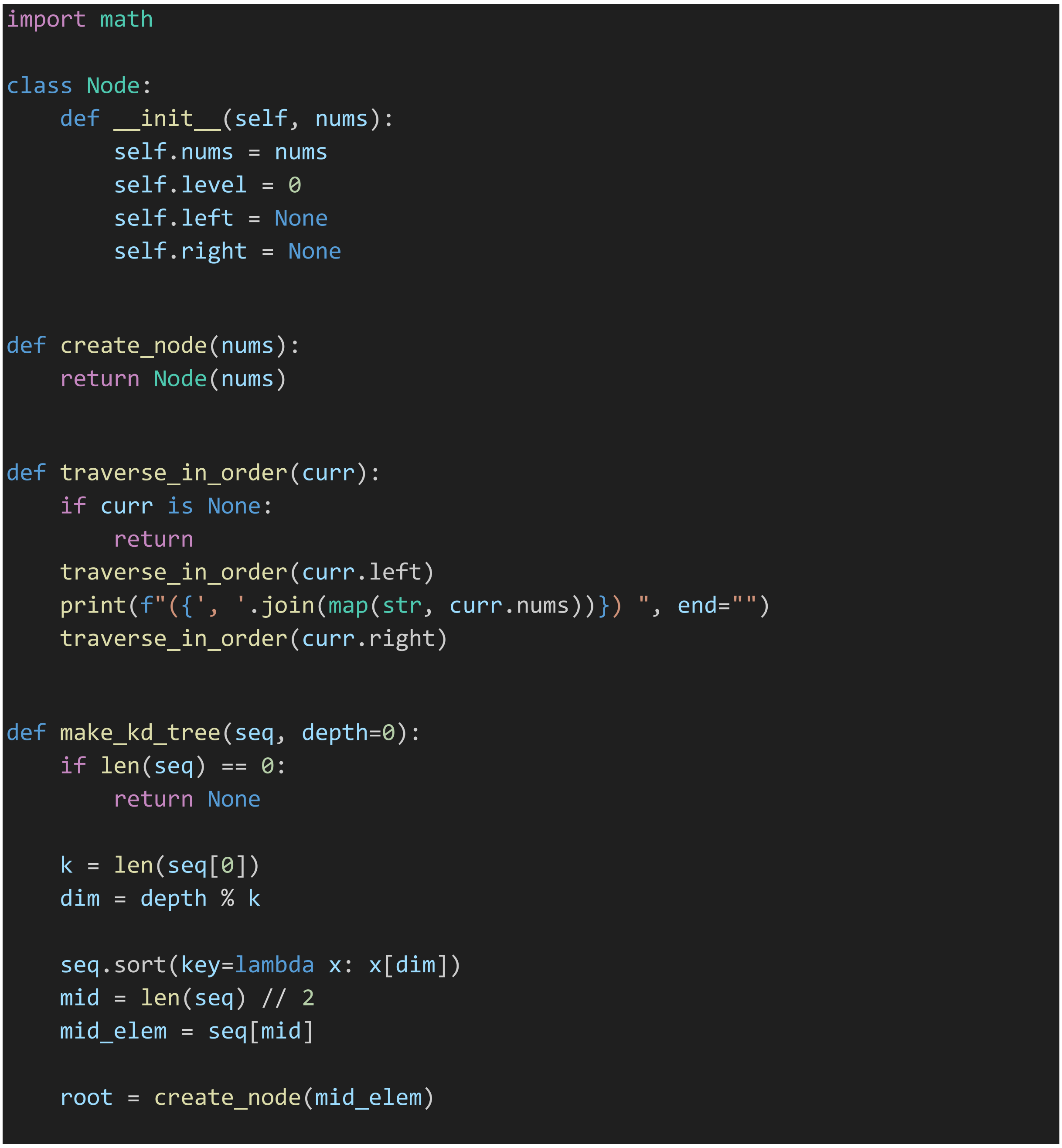
Batch C22

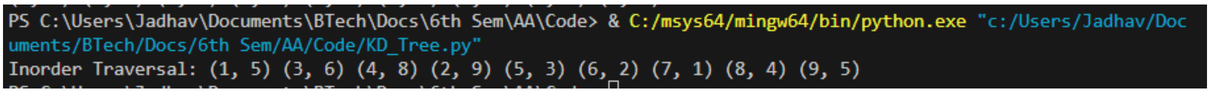
AIM: Implement KD-Tree.

CODE:



```python
import math

class Node:
    def __init__(self, nums):
        self.nums = nums
        self.level = 0
        self.left = None
        self.right = None


def create_node(nums):
    return Node(nums)


def traverse_in_order(curr):
    if curr is None:
        return
    traverse_in_order(curr.left)
    print(f"({', '.join(map(str, curr.nums))}) ", end="")
    traverse_in_order(curr.right)


def make_kd_tree(seq, depth=0):
    if len(seq) == 0:
        return None

    k = len(seq[0])
    dim = depth % k

    seq.sort(key=lambda x: x[dim])
    mid = len(seq) // 2
    mid_elem = seq[mid]

    root = create_node(mid_elem)
    left_sub_arr = seq[:mid]
    right_sub_arr = seq[mid+1:]

    root.level = depth
    root.left = make_kd_tree(left_sub_arr, depth+1)
    root.right = make_kd_tree(right_sub_arr, depth+1)

    return root


if __name__ == "__main__":
    seq = [[6,2], [7,1], [2,9], [3,6], [4,8], [8,4], [5,3], [1,5], [9,5]]
    root = make_kd_tree(seq)
    print("Inorder Traversal: ",end='')
    traverse_in_order(root)
```

OUTPUT:



```
PS C:\Users\Jadhav\Documents\BTech\Docs\6th Sem\AA\Code> & C:/msys64/mingw64/bin/python.exe "c:/Users/Jadhav/Doc
uments/BTech/Docs/6th Sem/AA/Code/KD_Tree.py"
Inorder Traversal: (1, 5) (3, 6) (4, 8) (2, 9) (5, 3) (6, 2) (7, 1) (8, 4) (9, 5)
```