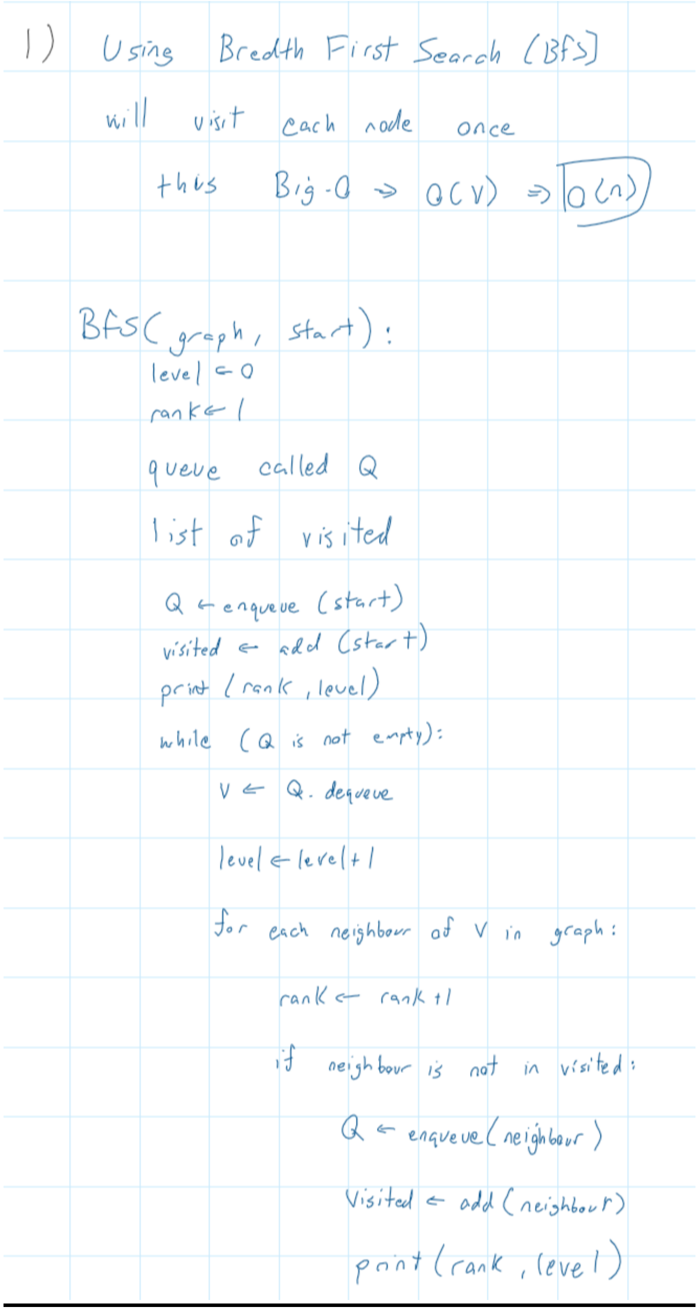
Name (Student ID): Anik Patel (40091908) Teacher: Dhrubajyoti Goswami

Course-section: COMP 352-AA Submission Date: June 13th, 2019

Assignment 3 – Theory Questions

Q1)



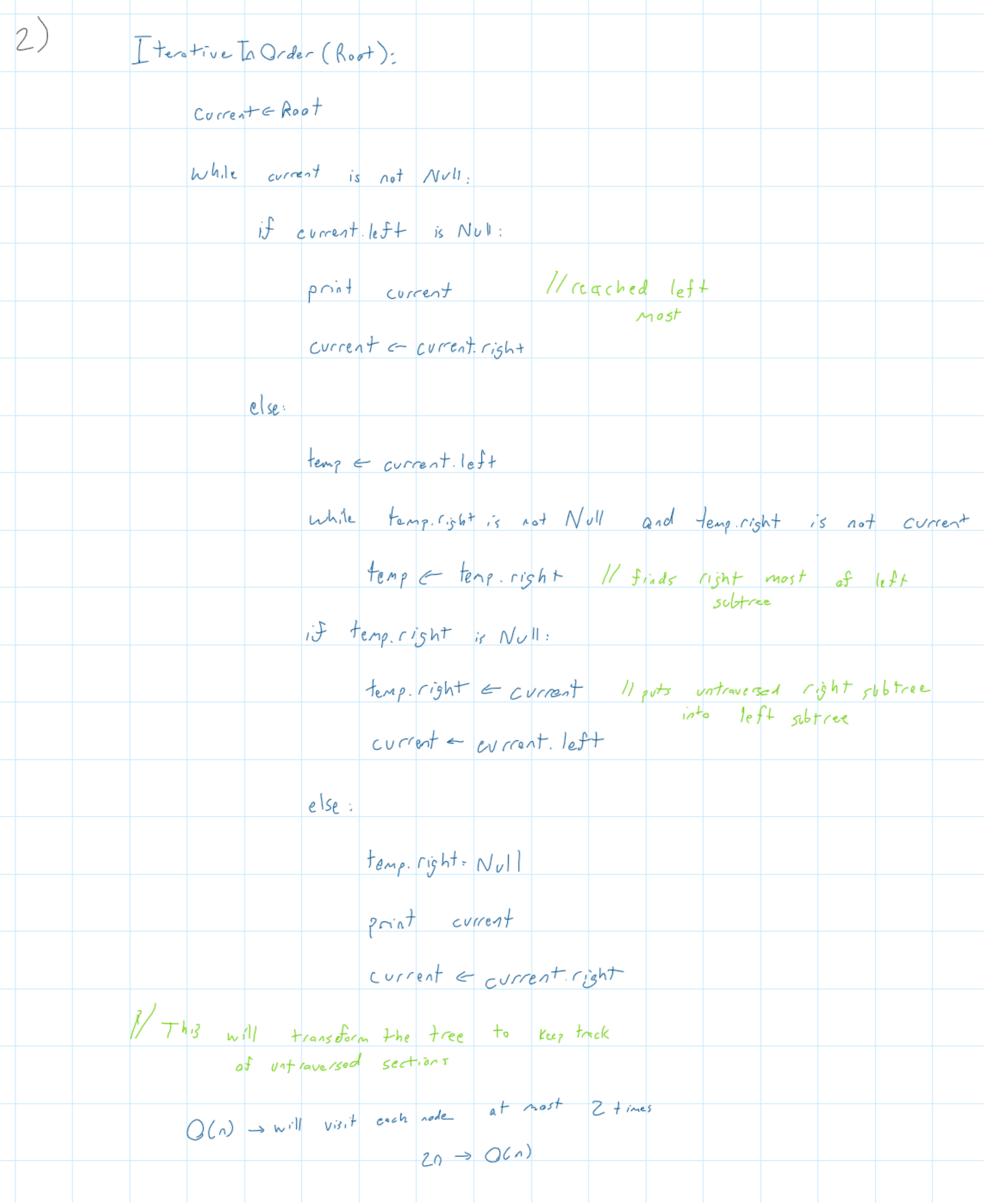
1) Using Bredth First Search (BFS)

will visit each node once

this Big-O ⇒ O(V) ⇒ $\boxed{O(n)}$

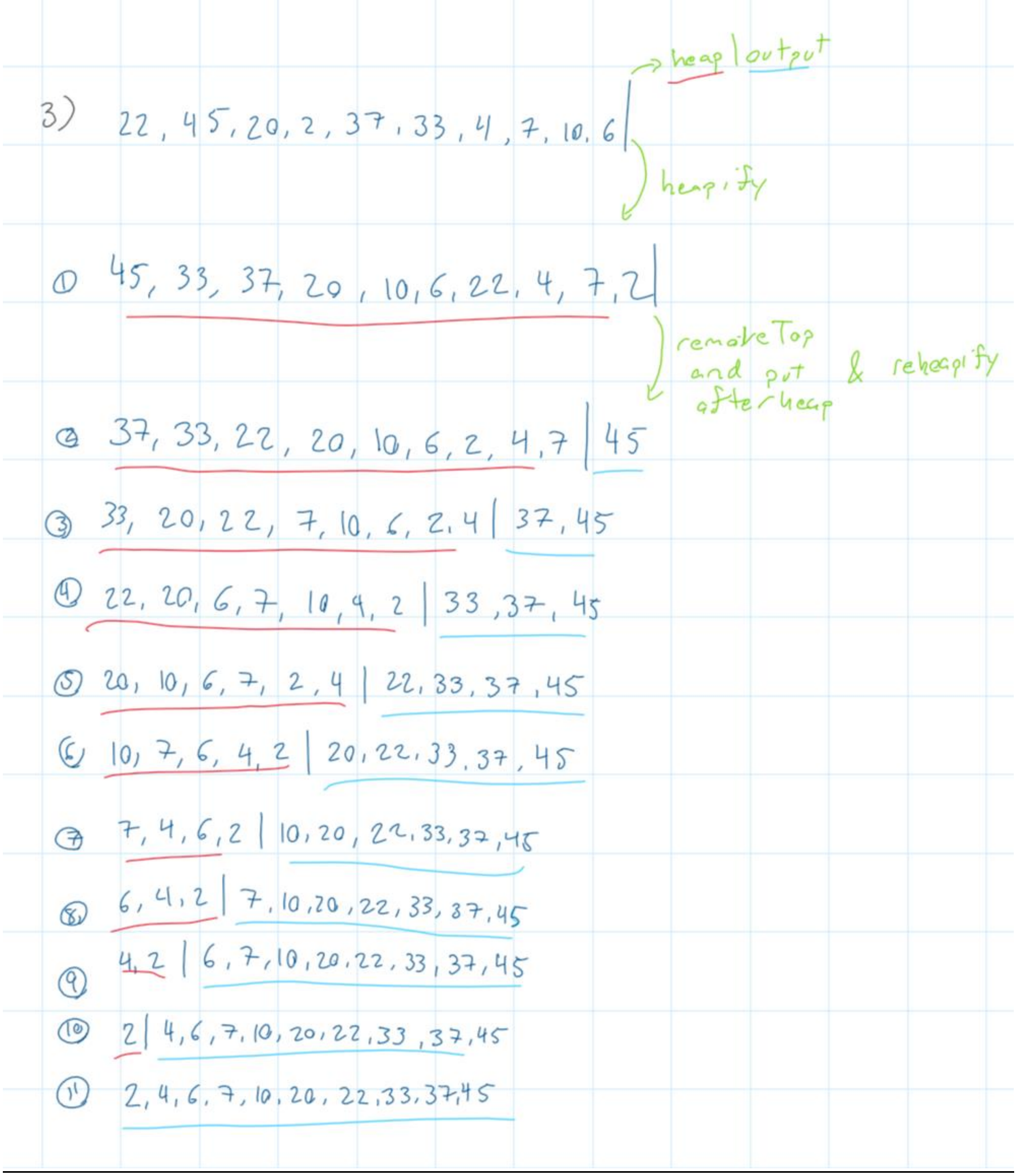
```
BFS(graph, start):
    level ← 0
    rank ← 1
    queue called Q
    list of visited
    Q ← enqueue (start)
    visited ← add (start)
    print (rank, level)
    while (Q is not empty):
        v ← Q.dequeue
        level ← level+1
        for each neighbour of V in graph:
            rank ← rank+1
            if neighbour is not in visited:
                Q ← enqueue(neighbour)
                Visited ← add (neighbour)
                print (rank, level)
```

Q2)



```
2)   IterativeInOrder(Root):
        Current ← Root
        while current is not Null:
            if current.left is Null:
                print current            //reached left most
                current ← current.right
            else:
                temp ← current.left
                while temp.right is not Null and temp.right is not current
                    temp ← temp.right        // finds right most of left subtree
                if temp.right is Null:
                    temp.right ← current      // puts untraversed right subtree into left subtree
                    current ← current.left
                else:
                    temp.right = Null
                    print current
                    current ← current.right
    // This will transform the tree to keep track of untraversed sections
        O(n) → will visit each node at most 2 times
               2n → O(n)
```

Q3)



→ heap | output

3) 22, 45, 20, 2, 37, 33, 4, 7, 10, 6 |

heapify

① 45, 33, 37, 20, 10, 6, 22, 4, 7, 2 |

removeTop
and put
after heap
& reheapify

② 37, 33, 22, 20, 10, 6, 2, 4, 7 | 45

③ 33, 20, 22, 7, 10, 6, 2, 4 | 37, 45

④ 22, 20, 6, 7, 10, 4, 2 | 33, 37, 45

⑤ 20, 10, 6, 7, 2, 4 | 22, 33, 37, 45

⑥ 10, 7, 6, 4, 2 | 20, 22, 33, 37, 45

⑦ 7, 4, 6, 2 | 10, 20, 22, 33, 37, 45

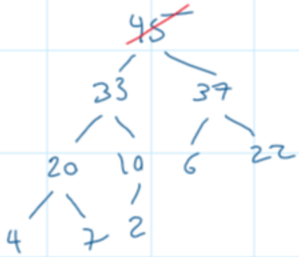
⑧ 6, 4, 2 | 7, 10, 20, 22, 33, 37, 45

⑨ 4, 2 | 6, 7, 10, 20, 22, 33, 37, 45

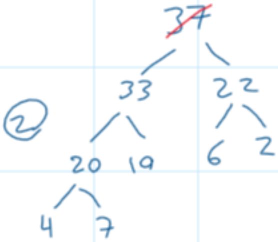
⑩ 2 | 4, 6, 7, 10, 20, 22, 33, 37, 45

⑪ 2, 4, 6, 7, 10, 20, 22, 33, 37, 45

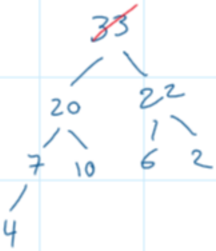
1



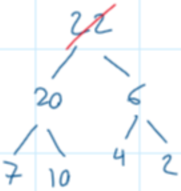
2



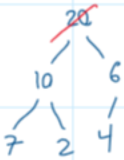
3



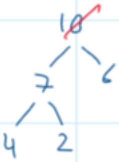
4



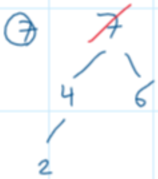
5



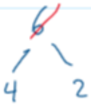
6



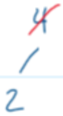
7



8



9



10