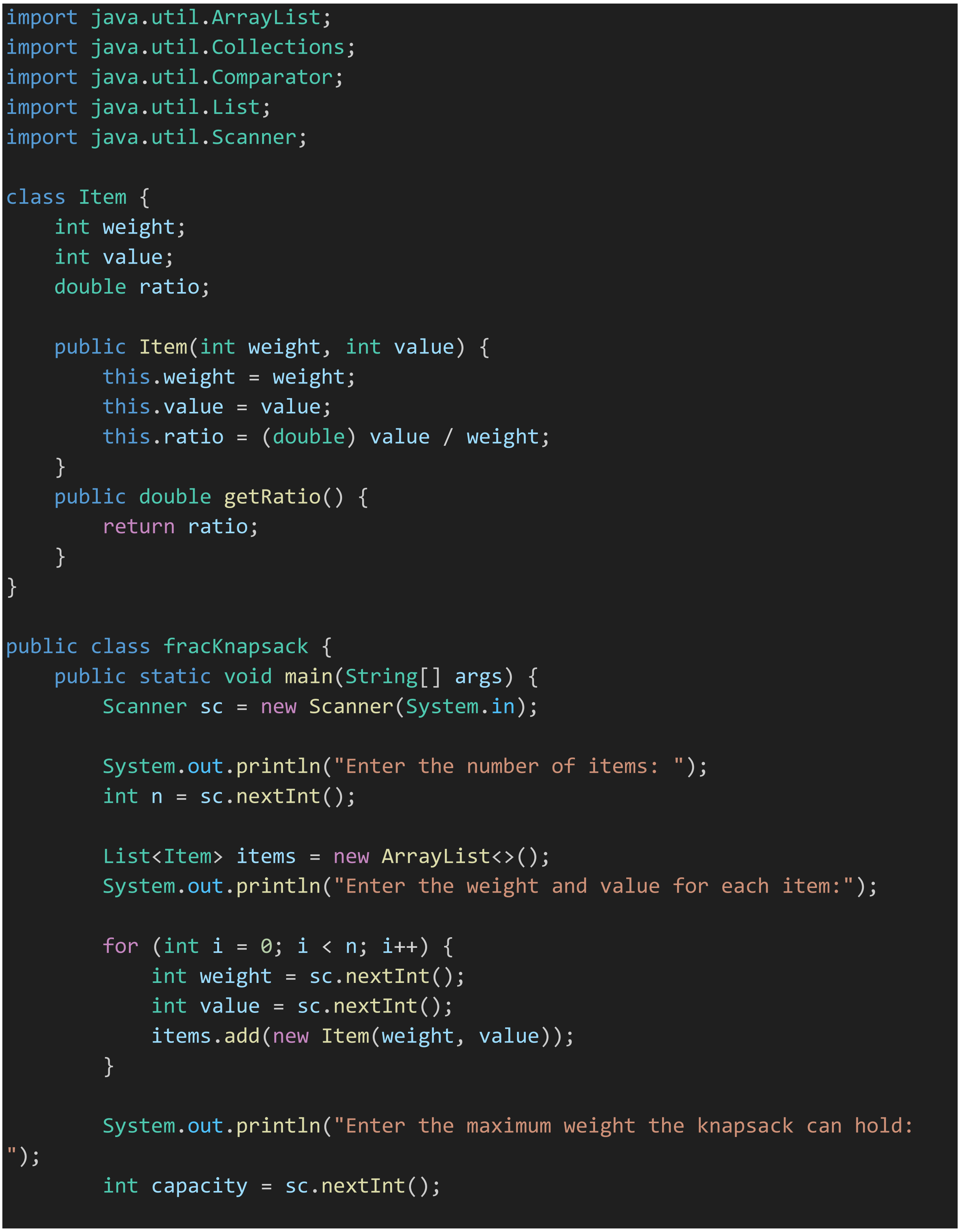
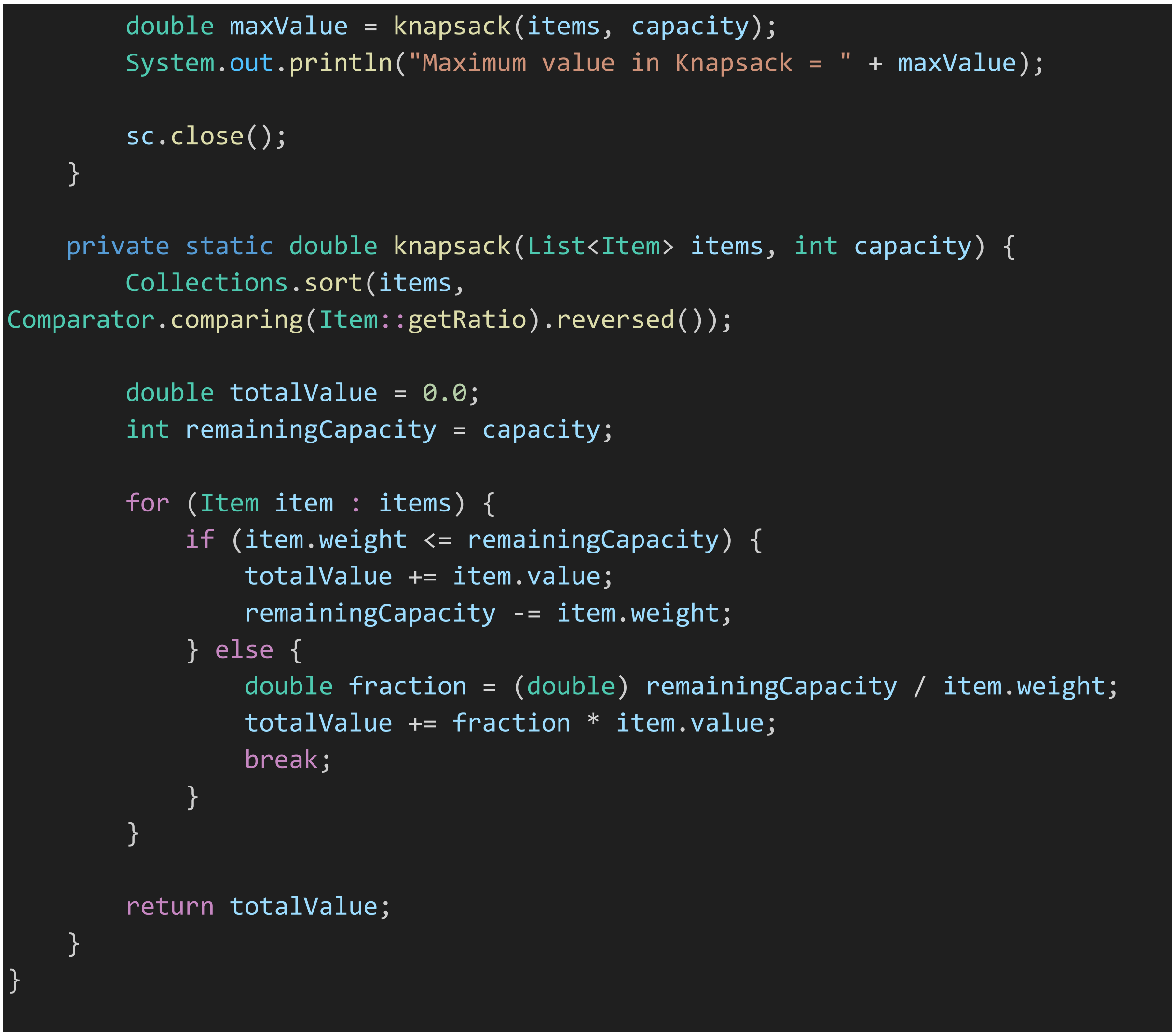
Assignment No:- 3

Q] Write a program to solve a fractional Knapsack problem using a greedy Method

Code

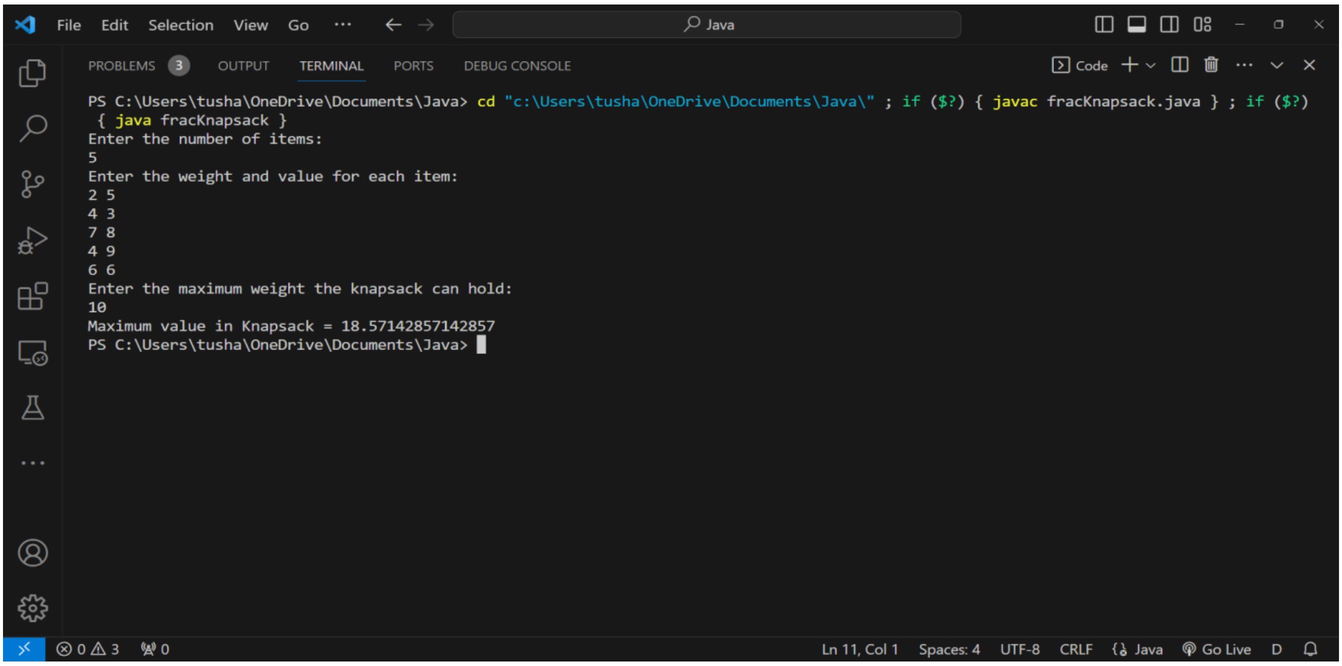


```
import java.util.ArrayList;
import java.util.Collections;
import java.util.Comparator;
import java.util.List;
import java.util.Scanner;

class Item {
    int weight;
    int value;
    double ratio;

    public Item(int weight, int value) {
        this.weight = weight;
        this.value = value;
        this.ratio = (double) value / weight;
    }
    public double getRatio() {
        return ratio;
    }
}

public class fracKnapsack {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);

        System.out.println("Enter the number of items: ");
        int n = sc.nextInt();

        List<Item> items = new ArrayList<>();
        System.out.println("Enter the weight and value for each item:");

        for (int i = 0; i < n; i++) {
            int weight = sc.nextInt();
            int value = sc.nextInt();
            items.add(new Item(weight, value));
        }

        System.out.println("Enter the maximum weight the knapsack can hold:
");

        int capacity = sc.nextInt();
```



```
        double maxValue = knapsack(items, capacity);
        System.out.println("Maximum value in Knapsack = " + maxValue);

        sc.close();
    }

    private static double knapsack(List<Item> items, int capacity) {
        Collections.sort(items,
Comparator.comparing(Item::getRatio).reversed());

        double totalValue = 0.0;
        int remainingCapacity = capacity;

        for (Item item : items) {
            if (item.weight <= remainingCapacity) {
                totalValue += item.value;
                remainingCapacity -= item.weight;
            } else {
                double fraction = (double) remainingCapacity / item.weight;
                totalValue += fraction * item.value;
                break;
            }
        }

        return totalValue;
    }
}
```

Output



```
PS C:\Users\tusha\OneDrive\Documents\Java> cd "c:\Users\tusha\OneDrive\Documents\Java\" ; if ($?) { javac fracKnapsack.java } ; if ($?)
 { java fracKnapsack }
Enter the number of items:
5
Enter the weight and value for each item:
2 5
4 3
7 8
4 9
6 6
Enter the maximum weight the knapsack can hold:
10
Maximum value in Knapsack = 18.57142857142857
PS C:\Users\tusha\OneDrive\Documents\Java> 
```