

Lab 8

Sushant Bansal
1410110454

Code:

```
#include <stdio.h>
#include <stdlib.h>
#include <time.h>

#define MAX_CAPACITY 40
#define MAX_ITEMS 10

typedef struct i{
    int value;
    int weight;
}item;

void printSack(item *arr, int n);
void fillBag(int max_weight,item *arr, int noOfItems);

int main(){
    srand(time(NULL));
    int k = MAX_CAPACITY; //Weight capacity of Knapsack
    int n = MAX_ITEMS; //Number of items

    item setOfItems[n];
    for(int i=0;i<n;i++){
        setOfItems[i].value = rand()%20 + 1;
        setOfItems[i].weight = rand()%20 + 1;
    }
    printSack(setOfItems,n);
    fillBag(MAX_CAPACITY,setOfItems,n);
}

void printSack(item *arr, int n){
    for(int i = 0;i<n;i++){
        printf("Item Number:%2d  Weight:%2d Value:%2d \n",i+1,arr[i].weight,arr[i].value);
    }
}

void sortSack(item *arr, int n){
    item temp;
    for(int i = 0;i<n;i++){
        for(int j = i;j<n-1;j++){
            if((double)arr[j].value/(double)arr[j].weight<(double)arr[j+1].value/
(double)arr[j+1].weight){
                temp.value = arr[j].value;
                temp.weight = arr[j].weight;
                arr[j].weight = arr[j+1].weight;
                arr[j].value = arr[j+1].value;
                arr[j+1].value = temp.value;
                arr[j+1].weight = temp.weight;
            }
        }
    }
}

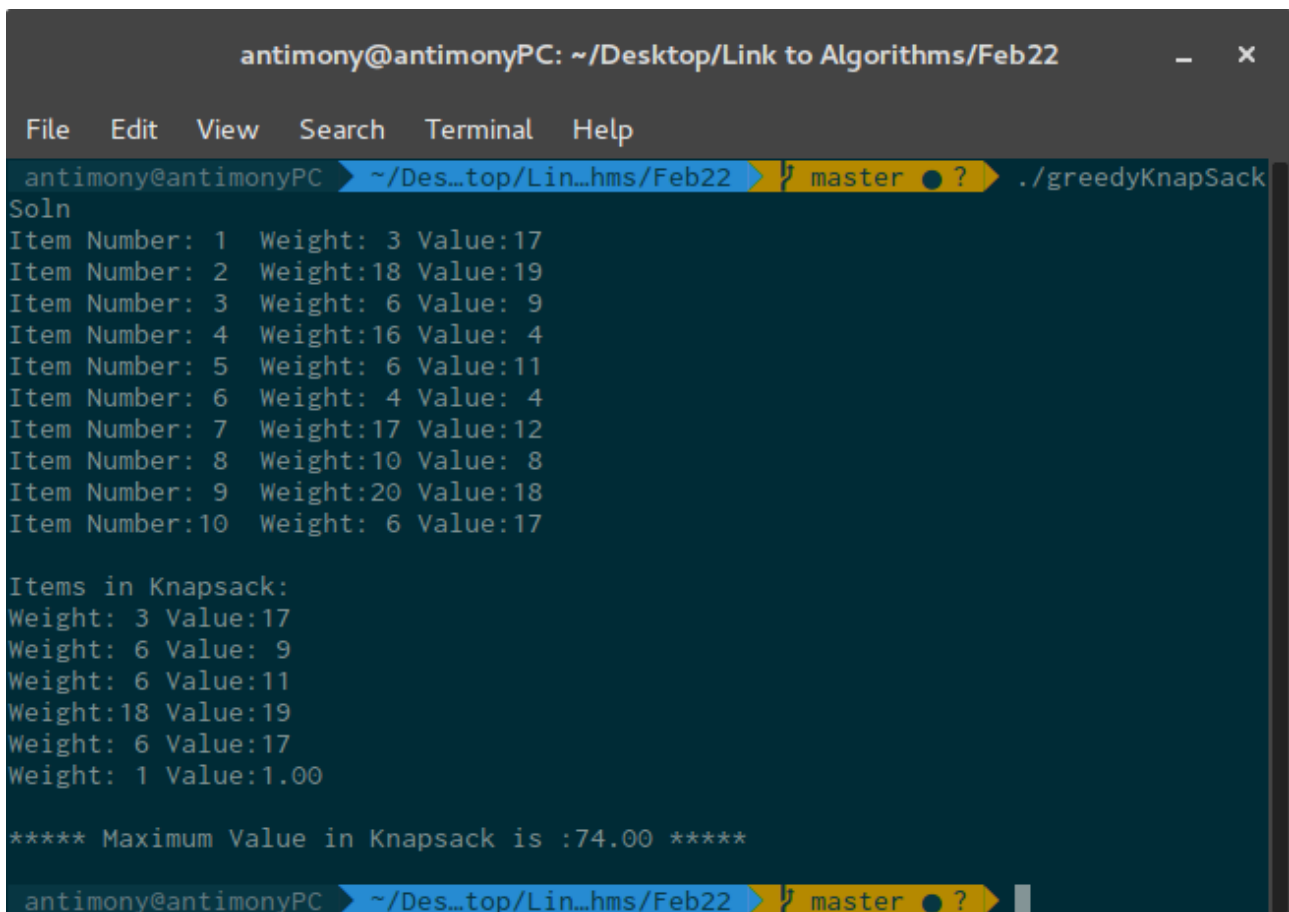
void fillBag(int max_weight,item *arr, int noOfItems){
    sortSack(arr,noOfItems);
    printf("\nItems in Knapsack: \n");
}
```

```

double currentWeight = 0;
double currentValue = 0;
int leftOff = 0;
for(int i=0;i<noOfItems;i++){
    if(currentWeight + arr[i].weight <= max_weight){
        currentWeight += arr[i].weight;
        currentValue += arr[i].value;
        printf("Weight:%2d Value:%2d \n",arr[i].weight,arr[i].value);
    }
    else{
        leftOff = max_weight - currentWeight;
        currentValue += leftOff * (double)arr[i].value/(double)arr[i].weight ;
        printf("Weight:%2d Value:%2.2f \n",leftOff,leftOff * (double)arr[i].value/
(double)arr[i].weight);
        break;
    }
}
printf("\n***** Maximum Value in Knapsack is :%2.2f *****\n\n",currentValue);
}

```

Screenshot:



```

antimony@antimonyPC: ~/Desktop/Link to Algorithms/Feb22
File Edit View Search Terminal Help
antimony@antimonyPC ~/Desktop/Link to Algorithms/Feb22 master ? ./greedyKnapSack
Soln
Item Number: 1 Weight: 3 Value:17
Item Number: 2 Weight:18 Value:19
Item Number: 3 Weight: 6 Value: 9
Item Number: 4 Weight:16 Value: 4
Item Number: 5 Weight: 6 Value:11
Item Number: 6 Weight: 4 Value: 4
Item Number: 7 Weight:17 Value:12
Item Number: 8 Weight:10 Value: 8
Item Number: 9 Weight:20 Value:18
Item Number:10 Weight: 6 Value:17

Items in Knapsack:
Weight: 3 Value:17
Weight: 6 Value: 9
Weight: 6 Value:11
Weight:18 Value:19
Weight: 6 Value:17
Weight: 1 Value:1.00

***** Maximum Value in Knapsack is :74.00 *****
antimony@antimonyPC ~/Desktop/Link to Algorithms/Feb22 master ?

```