

# RAJALAKSHMI ENGINEERING COLLEGE

RAJALAKSHMI NAGAR, THANDALAM – 602 105



**RAJALAKSHMI**  
**ENGINEERING COLLEGE**

**CS23331**

**DESIGN AND ANALYSIS OF ALGORITHM LAB**

**Laboratory Observation Note Book**

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Year / Branch / Section : . . . 2<sup>nd</sup> Year / AIML / A . . . . .

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**WEEK 04**

**GREEDY ALGORITHM**

**1) Write a program to take value V and we want to make change for V Rs, and we have infinite supply of each of the denominations in Indian currency, i.e., we have infinite supply of { 1, 2, 5, 10, 20, 50, 100, 500, 1000} valued coins/notes, what is the minimum number of coins and/or notes needed to make the change.**

**Input Format:**

**Take an integer from stdin.**

**Output Format:**

**print the integer which is change of the number.**

**Example Input :**

**64**

**Output:**

**4**

**Explanaton:**

**We need a 50 Rs note and a 10 Rs note and two 2 rupee coins.**

**CODE:**

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

```
int main()
```

```
{
```

```
    int cost;
```

```
    scanf("%d",&cost);
```

```
    int coin[9] = {1,2,5,10,20,50,100,500,1000};
```

```
    int i=0, count= 0;
```

```
for (i=9-1; i>0; i--) {  
    while (cost >= coin[i]) {  
        cost -= coin[i];  
        count++;  
    }  
}  
printf("%d",count);  
}
```

### **OUTPUT:**

	Input	Expected	Got	
✓	49	5	5	✓

Passed all tests! ✓

**Correct**

Marks for this submission: 1.00/1.00.

2) Assume you are an awesome parent and want to give your children some cookies. But, you should give each child at most one cookie.

Each child  $i$  has a greed factor  $g[i]$ , which is the minimum size of a cookie that the child will be content with; and each cookie  $j$  has a size  $s[j]$ . If  $s[j] \geq g[i]$ , we can assign the cookie  $j$  to the child  $i$ , and the child  $i$  will be content. Your goal is to maximize the number of your content children and output the maximum number.

Example 1:

Input:

3

1 2 3

2

1 1

Output:

1

Explanation: You have 3 children and 2 cookies. The greed factors of 3 children are 1, 2, 3.

And even though you have 2 cookies, since their size is both 1, you could only make the child whose greed factor is 1 content.

You need to output 1.

Constraints:

$1 \leq g.length \leq 3 \times 10^4$

$0 \leq s.length \leq 3 \times 10^4$

$1 \leq g[i], s[j] \leq 2^{31} - 1$

**CODE:**

```
#include<stdio.h>

int main(){
    int chno,cono;
    int satisfied=0,j=0;
    scanf("%d",&chno);
    int child[chno];
    for(int i = 0;i<chno;i++){
        scanf("%d",&child[i]);
    }
    scanf("%d",&cono);
    int cookie[cono];
    for(int i = 0; i<cono;i++){
        scanf("%d",&cookie[i]);
    }
    for(int i=0;i<chno;i++){
        if(child[i]<=cookie[j]){
            satisfied+=1;
            j++;
        }
    }
    printf("%d",satisfied);
}
```

**OUTPUT:**

	Input	Expected	Got	
✓	2	2	2	✓
	1 2			
	3			
	1 2 3			

Passed all tests! ✓

Correct

Marks for this submission: 1.00/1.00.

3) A person needs to eat burgers. Each burger contains a count of calorie. After eating the burger, the person needs to run a distance to burn out his calories.

If he has eaten  $i$  burgers with  $c$  calories each, then he has to run at least  $3^i * c$  kilometers to burn out the calories. For example, if he ate 3

burgers with the count of calorie in the order: [1, 3, 2], the kilometers he needs to run are  $(3^0 * 1) + (3^1 * 3) + (3^2 * 2) = 1 + 9 + 18 = 28$ .

But this is not the minimum, so need to try out other orders of consumption and choose the minimum value. Determine the minimum distance

he needs to run. Note: He can eat burger in any order and use an efficient sorting algorithm. Apply greedy approach to solve the problem.

**Input Format**

First Line contains the number of burgers

Second line contains calories of each burger which is  $n$  space-separate integers

**Output Format**

**Print:** Minimum number of kilometers needed to run to burn out the calories

**Sample Input**

3

5 10 7

**Sample Output**

76



**For example:**

Test	Input	Result
Test Case 1	3 1 3 2	18

**CODE:**

```
#include<stdio.h>
#include<math.h>
int main()
{
    int burg,i,j;
    scanf("%d",&burg);
    int cal[burg];
    for(i=0;i<burg;i++){
        scanf("%d",&cal[i]);
    }
    int temp,kms=0;
    for(i=0;i<burg-1;i++){
        for(j=0;j<burg-i-1;j++){
            if(cal[j]>cal[j+1]){
                temp=cal[j];
                cal[j]=cal[j+1];
                cal[j+1]=temp;
            }
        }
    }
    return 0;
}
```

```

        cal[j+1]=temp;
    }
}
}
j=burg;
for(i=0;i<burg;i++){
    kms+=(pow(burg,i)*cal[j-1]);
    j--;
}
printf("%d",kms);
return 0;
}

```

## OUTPUT:

	Test	Input	Expected	Got	
✓	Test Case 1	3 1 3 2	18	18	✓
✓	Test Case 2	4 7 4 9 6	389	389	✓
✓	Test Case 3	3 5 10 7	76	76	✓

Passed all tests! ✓

**Correct**

Marks for this submission: 1.00/1.00.

**4) Given an array of N integer, we have to maximize the sum of  $arr[i] * i$ , where i is the index of the element ( $i = 0, 1, 2, \dots, N$ ). Write an algorithm based on Greedy technique with a Complexity  $O(n \log n)$ .**

**Input Format:**

**First line specifies the number of elements-n**

**The next n lines contain the array elements.**

**Output Format:**

**Maximum Array Sum to be printed.**

**Sample Input:**

**5**

**2 5 3 4 0**

**Sample output:**

**40**

**CODE:**

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

```
int main()
```

```
{
```

```
    int N,temp,i,sum=0;
```

```
    scanf("%d",&N);
```

```
    int arr[N];
```

```
    for(i=0;i<N;i++){
```

```
        scanf("%d",&arr[i]);
```

```
    }
```

```
    for (int i = 0; i < N - 1; i++) {
```

```
int mind = i;
for (int j = i + 1; j < N; j++) {
    if (arr[j] < arr[mind]) {
        mind = j;
    }
}
temp = arr[mind];
arr[mind] = arr[i];
arr[i] = temp;
}
for(i=0;i<N;i++){
    sum=sum+arr[i]*i;
}
printf("%d",sum);
return 0;
}
```

**OUTPUT:**

	Input	Expected	Got	
✓	5 2 5 3 4 0	40	40	✓
✓	10 2 2 2 4 4 3 3 5 5 5	191	191	✓
✓	2 45 3	45	45	✓

Passed all tests! ✓

Correct

Marks for this submission: 1.00/1.00.

5) Given two arrays `array_One[]` and `array_Two[]` of same size `N`. We need to first rearrange the arrays such that the sum of the product of pairs( 1 element from each) is minimum. That is  $\text{SUM}(A[i] * B[i])$  for all `i` is minimum.

For example:

Input	Result
3	28
1	
2	
3	
4	
5	
6	

**CODE:**

```
#include<stdio.h>

int main()
{
    int N,i,j,temp,sum,flag=0;
    scanf("%d",&N);
    int arr1[N];
    int arr2[N];
    for(i=0;i<N;i++){
```

```

        scanf("%d",&arr1[i]);
    }
    for(i=0;i<N;i++){
        scanf("%d",&arr2[i]);
    }
    for (i=0;i<N-1;i++){
        for(j =0;j<N-i-1;j++){
            if(arr1[j]>arr1[j+1]){
                temp=arr1[j];
                arr1[j]=arr1[j+1];
                arr1[j+1]=temp;
            }
            if(arr2[j]>arr2[j+1]){
                temp=arr2[j];
                arr2[j]=arr2[j+1];
                arr2[j + 1]=temp;
            }
        }
    }
    i=0;
    j=N-1;
    while(flag<N){
        sum+=arr1[i]*arr2[j];
        i++;
    }

```

```

        j--;

        flag++;

    }

    printf("%d",sum);

}

```

## OUTPUT:

	Input	Expected	Got	
✓	3	28	28	✓
	1			
	2			
	3			
	4			
	5			
	6			
✓	4	22	22	✓
	7			
	5			
	1			
	2			
	1			
	3			
	4			
	1			
✓	5	590	590	✓
	20			
	10			
	30			
	10			
	40			
	8			
	9			
	4			
	3			
	10			

Passed all tests! ✓

**Correct**

Marks for this submission: 1.00/1.00.