**RAJALAKSHMI ENGINEERING COLLEGE**

**RAJALAKSHMI NAGAR, THANDALAM – 602 105**

A logo for a college

Description automatically generated

|  |
| --- |
| **CS23331**  **DESIGN AND ANALYSIS OF ALGORITHM LAB** |
| **Laboratory Observation Note Book** |

A white paper with black dots and blue lines

Description automatically generated with medium confidence

2024-2025

3rd Semester

231501090

M.MADHUMITHA

2nd Year/ AIML / B

**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:**

**A green and white rectangle

Description automatically generated**

**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] >= 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 <= g.length <= 3 \* 10^4**

**0 <= s.length <= 3 \* 10^4**

**1 <= g[i], s[j] <= 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:**

**A green and white rectangle

Description automatically generated**

**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 *3i \* 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 (30 \* 1) + (31 \* 3) + (32 \* 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;

}

}

}

j=burg;

for(i=0;i<burg;i++){

kms+=(pow(burg,i)\*cal[j-1]);

j--;

}

printf("%d",kms);

return 0;

}

**OUTPUT:**

**A screenshot of a computer

Description automatically generated**

**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, ..., N).Write an algorithm based on Greedy technique with a Complexity O(nlogn).**

**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:**

**A screenshot of a computer

Description automatically generated**

**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 SUM (A[i] \* B[i]) for all i is minimum.**

**For example:**

| Input | Result |
| --- | --- |
| 3  1  2  3  4  5  6 | 28 |

**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:**

**A screenshot of a computer

Description automatically generated**