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**DEPT : B E COMPUTER SCIENCE AND ENGINEERING - B**

**Greedy Algorithm**

* 1. **1-G-Coin Problem**

**Aim**: 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.

### Algorithm:

Int main() { initialize amt

initialize count to

0 read amt from

user

// array of currency denominations

initialize arr as {1, 2, 5, 10, 20, 50, 100, 500, 1000}

// loop through currency denominations from highest to lowest for i from 8 down to 0 {

count = count + (amt divided by arr[i]) // calculate number of notes of current denomination

amt = amt modulo arr[i] // update amt to the remaining amount

}

print count // output the total count of notes

}

### Program:

#include <stdio.h>

int main()

{

int amt,count=0; scanf("%d",&am t);

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

for (int i=8;i>=0;i--)

{

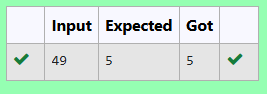
count+=amt/arr[i]; amt%=arr[i];

}

printf("%d",count);

}

**Output:**



# 2-G-Cookies Problem

## Aim:

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

### Algorithm:

function main() {

initialize n // number of children

read n

initialize greed array of size n // array to hold children's greed factors

// read greed factors for each child for i from 0 to n-1 {

read greed[i] from user

}

initialize c // number of cookie sizes read c from user

initialize csize array of size c // array to hold cookie sizes

// read cookie sizes for j from 0 to c-1 {

read csize[j] from user

}

initialize count to 0 // counter for satisﬁed children

// check each child's greed against available cookie sizes for i from 0 to n-1 {

for j from 0 to c-1 {

if csize[j] is greater than or equal to greed[i] { increment count by 1 // child is satisﬁed

break // exit inner loop after satisfying this child

}

}

}

print count // output the total count of satisﬁed children

}

### Program:

#include<stdio.h

>

#include<string.h

>

int main(){ int n;

scanf("%d",&n); int greed[n]; for(int i=0;i<n;i++){

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

}

int c; scanf("%d",&c); int csize[c];

for(int i=0;i<c;i++){ scanf("%d ",&csize[i]);

}

int count=0; for(int i=0;i<n;i++){

for(int j=0;j<c;j++){

if (csize[j]>=greed[i]){ count++;

break;

}

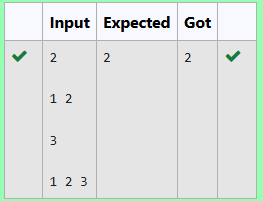
}

}

printf("%d",count);

}

**Output:**



# 3-G-Burger Problem

## Aim:

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

### Algorithm:

int main() {

initialize n // number of elements read n from user

initialize cal array of size n // array to hold integers

// read values into the cal array for i from 0 to n-1 { read cal[i] from user

}

// sorting the array using bubble sort for i from 0 to n-2 {

for j from 0 to n-i-2 {

if cal[j] is greater than cal[j+1] {

// swap cal[j] and cal[j+1] initialize temp as cal[j] cal[j] = cal[j+1]

cal[j+1] = temp

}

}

}

initialize mulfact // variable to hold power value initialize sum to 0 // variable to hold the ﬁnal sum initialize h to

n-1 // index for the last element

// compute the weighted sum for i from 0 to n-1 {

mulfact = n raised to the power of i // compute n^i

sum = sum + (mulfact \* cal[h]) // accumulate the weighted sum h

= h - 1 // move to the next element

}

print sum // output the ﬁnal result

}

**Program:** #include<stdio.h> #include<math.h>

int main(){ int n;

scanf("%d",&n); int cal[n];

for(int i=0;i<n;i++){ scanf("%d ",&cal[i]);

}

//sorting the array int i, j, temp;

for (i = 0; i < n-1; i++) {

for (j = 0; j < n-i-1; j++) { if (cal[j] >

cal[j+1]) {

temp = cal[j]; cal[j] = cal[j+1]; cal[j+1] = temp;

}

}

}

int mulfact; int sum=0; int h=n-1;

for(int i=0;i<n;i++)

{

mulfact=pow(n,i); sum+=mulfact\*cal[h

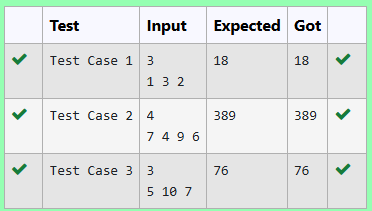
]; h--;

}

printf("%d",sum);

}

**Output:**



# 4-G-Array Sum Max Problem

## Aim:

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

## Algorithm:

function main() {

initialize n // number of elements read n from user

initialize arr array of size n // array to hold integers

// read values into the arr array for i from 0 to n-1 {

read arr[i] from user

}

// sorting the array using bubble sort

for i from 0 to n-2 {

for j from 0 to n-i-2 {

if arr[j] is greater than arr[j+1] {

// swap arr[j] and arr[j+1] initialize temp as arr[j] arr[j] = arr[j+1]

arr[j+1] = temp

}

}

}

initialize prod to 0 // variable to hold the weighted sum

// compute the weighted sum for i from 0 to n-1 {

prod = prod + (arr[i] \* i) // accumulate the weighted sum

}

print prod // output the ﬁnal result

}

**Program:** #include<stdio. h> int main(){

int n; scanf("%d",&n); int arr[n];

for(int i=0;i<n;i++){ scanf("%d",&arr[i]);

}

for(int i=0;i<n-1;i++){ for(int j=0;j<n-i-1;j++){

if(arr[j]>arr[j+1]){ int temp=arr[j]; arr[j]=arr[j+1]; arr[j+1]=temp;

}

}

}

int prod=0; for(int

i=0;i<n;i++){

prod+=(arr[i]\*i)

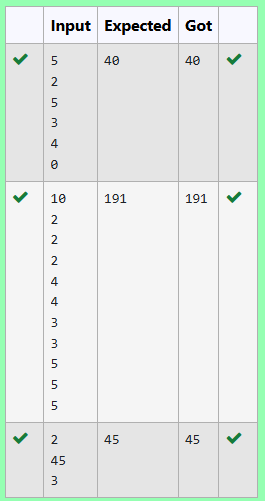
;

}

printf("%d",prod);

}

**Output:**



# 5-G-Product of Array Elements-Minimum

## Aim:

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.

## Algorithm:

function main() {

initialize n // number of elements read n from user

initialize array\_One of size n // ﬁrst array initialize array\_Two of size n // second array

// read values into array\_One for i from 0 to n-1

{

read array\_One[i] from user

}

// read values into array\_Two for i from 0 to n-1

{

read array\_Two[i] from user

}

// sorting both arrays for i from 0 to n-2 {

for j from 0 to n-i-2 {

// sort array\_One in ascending order

if array\_One[j+1] is less than array\_One[j] {

// swap array\_One[j] and array\_One[j+1] initialize temp as array\_One[j] array\_One[j] = array\_One[j+1] array\_One[j+1] = temp

}

// sort array\_Two in descending order

if array\_Two[j+1] is greater than array\_Two[j] {

// swap array\_Two[j] and array\_Two[j+1] initialize temp as array\_Two[j] array\_Two[j] = array\_Two[j+1] array\_Two[j+1] = temp

}

}

}

initialize sum to 0 // variable to hold the ﬁnal sum

// calculate the sum of products of corresponding elements for i from 0 to n-1 {

sum = sum + (array\_One[i] \* array\_Two[i]) // accumulate the product

}

print sum // output the ﬁnal result

}

**Program:** #include<stdio.h> int main(){

int n; scanf("%d",&n);

int array\_One[n]; int array\_Two[n];

for(int i=0;i<n;i++){

scanf("%d ",&array\_One[i]);

}

for(int i=0;i<n;i++){

scanf("%d ",&array\_Two[i]);

}

for(int i=0;i<n-1;i++){ for(int j=0;j<n-i-1;j++){

if(array\_One[j+1]<array\_One[j]){ int temp=array\_One[j]; array\_One[j]=array\_One[j+1]; array\_One[j+1]=temp;

}

if(array\_Two[j+1]>array\_Two[j]){ int temp=array\_Two[j]; array\_Two[j]=array\_Two[j+1]; array\_Two[j+1]=temp;

}

}

}

int sum=0;

for(int i=0;i<n;i++){ sum+=(array\_One[i]\*array\_Two[i]);

}

printf("%d",sum);

}

## Output:

