

## CS23331 DESIGN AND ANALYSIS OF ALGORITHMS

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### SAMPLE PRACTICE PROBLEMS

#### Question 1:

Given two numbers, write a C program to swap the given numbers.

**For example:**

Input	Result
10 20	20 10

Aim:

To write a c program to swap given two numbers.

Program :

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

```
int main()
```

```
{
```

```
    int a, b, c;
```

```
    scanf("%d %d", &a, &b);
```

```
    c = a;
```

```
    a = b;
```

```
    b = c;
```

```
    printf("%d %d", a, b);
```

```
}
```

Input and Output:

	Input	Expected	Got	
✓	10 20	20 10	20 10	✓

Passed all tests! ✓

## Question 2:

Write a C program to find the eligibility of admission for a professional course based on the following criteria:

Marks in Maths  $\geq 65$

Marks in Physics  $\geq 55$

Marks in Chemistry  $\geq 50$  Or

Total in all three subjects  $\geq 180$

Sample Test Cases

Test Case 1

Input 70 60 80

Output The candidate is eligible

Test Case 2

Input 50 80 80

Output The candidate is eligibl

e Test Case 3 Input 50 60 40

Output The candidate is not eligible

Aim :

To Determine whether a candidate is eligible for admission based on subject marks and total score.

Program :

```
#include<stdio.h>

int main()
{
    int a, b, c;
    scanf("%d %d %d", &a, &b, &c);
    if((a >= 65 && b >= 55 && c >= 50) || (a + b + c) >= 180)
    {
        printf("The candidate is eligible");
    }
    else
    {
```

```

printf("The candidate is not eligible");
}
}

```

Input and Output:

	Input	Expected	Got	
✓	70 60 80	The candidate is eligible	The candidate is eligible	✓
✓	50 80 80	The candidate is eligible	The candidate is eligible	✓

Passed all tests! ✓

### Question 3:

Malini goes to BestSave hyper market to buy grocery items. BestSave hyper market provides 10% discount on the bill amount B when ever the bill amount B is more than Rs.2000.

The bill amount B is passed as the input to the program. The program must print the final amount A payable by Malini.

Input Format:

The first line denotes the value of B.

Output Format:

The first line contains the value of the final payable amount A.

Example Input/Output 1:

Input:

1900

Output:

1900

Example Input/Output 2:

Input:

3000

Output:

2700

Aim:

To Calculate the final amount payable after applying a discount for bills above a threshold.

Program :

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

```
int main()
```

```

{
    int s;
    scanf("%d", &s);
    if(s <= 2000)
    {
        printf("%d", s);
    }
    else
    {
        int d = s * 0.1;
        s = s - d;
        printf("%d", s);
    }
}

```

Input and Output:

	Input	Expected	Got	
✓	1900	1900	1900	✓
✓	3000	2700	2700	✓

Passed all tests! ✓

## Question 4:

Baba is very kind to beggars and every day Baba donates half of the amount he has when ever a beggar requests him. The money M left in Baba's hand is passed as the input and the number of beggars B who received the alms are passed as the input. The program must print the money Baba had in the beginning of the day.

### Input Format:

The first line denotes the value of M.  
The second line denotes the value of B.

### Output Format:

The first line denotes the value of money with Baba in the beginning of the day.

### Example Input/Output:

Input:

100  
2

Output:

400

Explanation:

Baba donated to two beggars. So when he encountered second beggar he had  $100 \times 2 = \text{Rs.}200$  and when he encountered 1st he had  $200 \times 2 = \text{Rs.}400$ .

Aim:

To Find the initial amount of money Baba had after donating half his money multiple times.

Program:

```
#include<stdio.h>

int main()
{
    int a, b;

    scanf("%d %d", &a, &b);

    for(int i = 0; i < b; i++)
    {
        a *= 2;
    }

    printf("%d", a);
}
```

Input and Output:

	Input	Expected	Got	
✓	100 2	400	400	✓

Passed all tests! ✓

## Question 5:

The CEO of company ABC Inc wanted to encourage the employees coming on time to the office. So he announced that for every consecutive day an employee comes on time in a week (starting from Monday to Saturday), he will be awarded Rs.200 more than the previous day as "Punctuality Incentive". The incentive I for the starting day (ie on Monday) is passed as the input to the program. The number of days N an employee came on time consecutively starting from Monday is also passed as the input. The program must calculate and print the "Punctuality Incentive" P of the employee.

### Input Format:

The first line denotes the value of I.  
The second line denotes the value of N.

### Output Format:

The first line denotes the value of P.

### Example Input/Output:

Input:

500  
3

Output:

2100

Explanation:

On Monday the employee receives Rs.500, on Tuesday Rs.700, on Wednesday Rs.900

So total = Rs.2100

Aim :

To Calculate the total incentive earned by an employee for consecutive punctual days.

Program:

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

```
int main()
```

```
{
```

```
    int a, b, sum = 0;
```

```
    scanf("%d %d", &a, &b);
```

```
    for(int i = 0; i < b; i++)
```

```
    {
```

```
        sum += a;
```

```
        a += 200;
```

```
    }
```

```
    printf("%d", sum);
```

```
}
```

Input and Output:

	Input	Expected	Got	
✓	500 3	2100	2100	✓
✓	100 3	900	900	✓

Passed all tests! ✓

## Question 6:

Two numbers M and N are passed as the input. A number X is also passed as the input. The program must print the numbers divisible by X from N to M (inclusive of M and N).

### Input Format:

The first line denotes the value of M  
The second line denotes the value of N  
The third line denotes the value of X

### Output Format:

Numbers divisible by X from N to M, with each number separated by a space.

### Boundary Conditions:

1 <= M <= 99999999  
M < N <= 99999999  
1 <= X <= 9999

### Example Input/Output 1:

Input:

2  
40  
7

Output:

35 28 21 14 7

### Example Input/Output 2:

Input:

66  
121  
11

Output:

121 110 99 88 77 66

Aim:

To Print numbers divisible by a given value within a specified range.

Program :

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

```
int main()
```

```
{
```

```
    int a, b, c;
```

```
    scanf("%d %d %d", &a, &b, &c);
```

```
    for(int i = b; i >= a; i--)
```

```

{
    if(i % c == 0)
    {
        printf("%d ", i);
    }
}
}

```

Input and Output:

	Input	Expected	Got	
✓	2 40 7	35 28 21 14 7	35 28 21 14 7	✓

Passed all tests! ✓

### Question 7:

Write a C program to find the quotient and remainder of given integers.

**For example:**

Input	Result
12	4
3	0

Aim:

To Find and display the quotient and remainder of two integers.

Program :

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

```
int main()
```

```
{
```

```
    int a, b;
```

```
    scanf("%d %d", &a, &b);
```



```

int c = a / b;

int d = a % b;

printf("%d\n%d", c, d);
}

```

Input and Output:

	Input	Expected	Got	
✓	12	4	4	✓
	3	0	0	

Passed all tests! ✓

### Question 8:

Write a C program to find the biggest among the given 3 integers?

**For example:**

Input	Result
10 20 30	30

Aim:

To Identify and display the largest number among three given integers.

Program:

```

#include<stdio.h>

int main()
{
    int a, b, c;

    scanf("%d %d %d", &a, &b, &c);

    if(a > b && a > c)
    {

```

```

    printf("%d", a);
}
else if(b > a && b > c)
{
    printf("%d", b);
}
else
{
    printf("%d", c);
}
}

```

Input and Output:

	Input	Expected	Got	
✓	10 20 30	30	30	✓

Passed all tests! ✓

## Question 9:

Write a C program to find whether the given integer is odd or even?

**For example:**

Input	Result
12	Even
11	Odd

Aim:

To Determine whether a given integer is odd or even.

Program:

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

```
int main()
```

```
{
```

```

int a;

scanf("%d", &a);

if(a % 2 == 0)
{
    printf("Even");
}
else
{
    printf("Odd");
}
}

```

Input and Output:

	Input	Expected	Got	
✓	12	Even	Even	✓
✓	11	Odd	Odd	✓

Passed all tests! ✓

### Question 10:

Write a C program to find the factorial of given n.

**For example:**

Input	Result
5	120

Aim:

To Calculate and display the factorial of a given number.

Program :

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

```
int main()
```

```

{
    int a;
    scanf("%d", &a);
    int sum = 1;
    for(int i = 1; i <= a; i++)
    {
        sum *= i;
    }
    printf("%d", sum);
}

```

Input and Output:

	Input	Expected	Got	
✓	5	120	120	✓

Passed all tests! ✓

### Question 11:

Write a C program to find the sum first N natural numbers.

**For example:**

Input	Result
3	6

Aim:

To Compute the sum of the first N natural numbers.

Program :

```

#include<stdio.h>

int main()
{
    int a, sum = 0;
    scanf("%d", &a);

```

```

for(int i = 1; i <= a; i++)
{
    sum += i;
}
printf("%d", sum);
}

```

Input and Output:

	Input	Expected	Got	
✓	3	6	6	✓

Passed all tests! ✓

## Question 12:

Write a C program to find the Nth term in the fibonacci series.

**For example:**

Input	Result
0	0
1	1

Aim:

To Find and display the Nth term in the Fibonacci series.

Program :

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

```
int main()
```

```
{
```

```
    int n, a = 0, b = 1, c, i;
```

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

```
    if(n == 0)
```

```

{
    printf("0");
}
else
{
    for(i = 2; i <= n; i++)
    {
        c = a + b;
        a = b;
        b = c;
    }
    printf("%d", b);
}
}

```

Input and Output:

	Input	Expected	Got	
✓	0	0	0	✓
✓	1	1	1	✓
✓	4	3	3	✓

### Question 13:

Write a C program to find the power of integers.

input:

a b

output:

a^b value

Aim:

To Calculate the power of one integer raised to another.

Program:

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

```
#include<math.h>
```

```
int main()
```

```
{
```

```
    int a, b;
```

```
    scanf("%d %d", &a, &b);
```

```
    int c = pow(a, b);
```

```
    printf("%d", c);
```

```
}
```

Input and Output:

	Input	Expected	Got	
✓	2 5	32	32	✓

### Question 14:

Write a C program to find Whether the given integer is prime or not.

For example:

Input	Result
7	Prime
9	No Prime

Aim:

To Determine whether a given number is a prime number.

Program :

```
#include<stdio.h>

int main()
{
    int a, flag = 1;
    scanf("%d", &a);
    for(int i = 2; i <= a / 2; i++)
    {
        if(a % i == 0)
        {
            printf("No Prime");
            flag = 0;
            break;
        }
    }
    if(flag == 1)
    {
        printf("Prime");
    }
}
```

Input and Output:

	Input	Expected	Got	
✓	7	Prime	Prime	✓
✓	9	No Prime	No Prime	✓

Passed all tests! ✓



Question 15:

**Write a C program to find the reverse of the given integer?**

Aim:

To Find and display the reverse of a given integer.

Program :

```
#include<stdio.h>

int main()
{
    int a, reverse = 0, rem;
    scanf("%d", &a);
    while(a != 0)
    {
        rem = a % 10;
        reverse = reverse * 10 + rem;
        a /= 10;
    }
    printf("%d", reverse);
}
```

Input and Output:

	Input	Expected	Got	
✓	123	321	321	✓

Passed all tests! ✓