



INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Programming in C and C++ (CSC-101) - Lab 4

**Assignment 4**

**40 marks**

**Note : (No loops/ switch condition are allowed to be used)**

Q-1) Write a program that calculates the Body Mass Index (BMI) based on weight and height inputs. Classify the BMI according to the World Health Organization's categories:

Underweight: BMI < 18.5

Normal weight: BMI >= 18.5 and < 25

Overweight: BMI >= 25 and < 30

Obesity: BMI >= 30

```
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)
#include<stdio.h>
#include<math.h>

int main() {
    float w , h;
    printf("Enter the weight(in kgs):");
    scanf("%f",&w);

    printf("Enter the height(in m):");
    scanf("%f",&h);

    float BMI = (float)w/(h*h) ;
    printf("Your BMI is:%f and ",BMI);
    if (BMI < 18.5) {
        printf("You Are Underweight\n");
    }
    else if (BMI >= 18.5 && BMI < 25) {
        printf("Normal Weight\n");
    }
    else if (BMI >=25 && BMI <30) {
        printf("You are Overweight\n");
    }
    else if (BMI >= 30) {
        printf("You are suffering from obesity\n");
    }
    return 0;
}

28,0-1      All
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garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question1
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)$ cd Question1 && vim ql.c
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question1$ ./a.out
Enter the weight(in kgs):69
Enter the height(in m):1.73
Your BMI is:23.054562 and Normal Weight
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question1$ ./a.out
Enter the weight(in kgs):53
Enter the height(in m):1.76
Your BMI is:17.110022 and You Are Underweight
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question1$ ./a.out
Enter the weight(in kgs):79
Enter the height(in m):1.75
Your BMI is:25.795918 and You are Overweight
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question1$ ./a.out
Enter the weight(in kgs):110
Enter the height(in m):1.85
Your BMI is:32.140247 and You are suffering from obesity
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question1$
```

Q-2) On a standard N×N chessboard, each square is identified by a coordinate pair (x, y), where x represents the row number and y represents the column number. The rows and columns are numbered from 1 to N. The square in the top-left corner (1,1) is Black, and the colors alternate between Black and White as you move to the right or downward. For example, (1,2) is White, (1,3) is Black again, and so on. Write a C program that takes two integers as input, representing the coordinates (x, y) of a square on the chessboard. The program should determine whether the square is Black or White. Also, take the N as input and check that the inputs (x,y) will always be between 1 and N. If not then give error to the user.

```
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question1 - □ ✎
#include<stdio.h>
#include<math.h>

int main() {
    int x, y, n ;
    printf("In NxN Chessboard , Enter the value of N:");
    scanf("%d",&n);
    printf("Enter the x coordinate:");
    scanf("%d",&x);
    printf("Enter the y coordinate:");
    scanf("%d",&y);

    if (x<=n && y<=n) {
        int s = x +y ;
        if (s%2 == 1) {printf("The Color of Box id White\n");}
        else if( s%2 == 0) {printf("The Color Of Box is Black\n");}
    }
    else if (printf("Error , Enter the correct values of coordinates.\n")
        )
}

return 0;
}
```

22,1 All

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garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question2 - □ ✎
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question1$ cd ..../Question2 && vim q2.c
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question2$ gcc q2.c
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question2$ ./a.out
In NxN Chessboard , Enter the value of N:8
Enter the x coordinate:5
ENter the y coordinate:6
The Color of Box id White
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question2$ ./a.out
In NxN Chessboard , Enter the value of N:8
Enter the x coordinate:9
ENter the y coordinate:1
Error , Enter the correct values of coordinates.
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question2$ ./a.out
In NxN Chessboard , Enter the value of N:8
Enter the x coordinate:8
ENter the y coordinate:8
The Color Of Box is Black
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question2$
```

Q-3) An alien gives you a four-digit number ranging between 1000 and 9999. Your task is to write a C program that analyzes this number based on the following mysterious rules:

1. If the sum of the outer digits (i.e., the 1st and 4th digits) is equal to the product of the inner digits (i.e., the 2nd and 3rd digits), then the number is to be "Accepted".
2. If the outer digits are both prime numbers and the inner digits are both even numbers, then the number should be "Considered".
3. For any other case, the number should be "Rejected".

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garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question3
include <stdio.h>
#include <math.h>

int main() {
    int n ;
    printf("Alien!! , Please enter the 4 digit number:");
    scanf("%d",&n);

    int o , ten , h , t ;
    o = n%10 ;
    ten = ((int)(n-o)/10)%10;
    h = ((int)(n-ten-o)/100)%10;
    t = ((n-h-ten-o)/1000.0);

    if (t+o == ten*h) {
        printf("According to Your Mysterious Rule,, The provided number is accepted\n");
    }

    else if ((o == 2||3||5||7) &&(t == 2||3||5||7) && ten%2 == 0 && h%2 == 0 ) {
        printf("Accorrding to Your Mysterious Rules,, The provided number should be Considered\n");
    }

    else if (printf("According to Your Mysterious Rules,, The provied number is Rejected\n"))
        return 0;
}
```

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garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question3
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question3$ cd .../Question3 && vim q3.c
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question3$ gcc q3.c
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question3$ ./a.out
Alien!! , Please enter the 4 digit number:5231
According to Your Mysterious Rule,, The provided number is accepted
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question3$ 7423
7423: command not found
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question3$ ./a.out
Alien!! , Please enter the 4 digit number:7423
Accorrding to Your Mysterious Rules,, The provided number should be Considered
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question3$ ./a.out
Alien!! , Please enter the 4 digit number:7586
According to Your Mysterious Rules,, The provied number is Rejected
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question3$
```

Q-4) You are given a 3-digit number where each digit is represented as a, b, and c (from hundreds to units place). Your task is to write a C program that analyzes the number and categorizes it based on specific patterns found in the digits:

1. If the digits are in strictly ascending order and the sum of the digits is divisible by 15, classify the number as "Magic".
2. Otherwise, if the digits are in strictly descending order and the product of the digits is even, classify it as "Mystic".
3. If the number forms a palindrome (i.e.,  $a == c$ ), classify it as "Enigma".
4. For all other cases, classify the number as "Ordinary".

```
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question3
#include<stdio.h>
#include<math.h>

int main() {
    int a , b , c ,n ;
    printf("Enter the 3 digit number:");
    scanf("%d",&n);

    c = n%10 ;
    b = ((int)(n-c)/10)%10 ;
    a = (int)(n-b-c)/100 ;

    if ((a+b+c)%15 == 0 && a<b && b<c) {
        printf("This Number is Magical\n");
    }
    else if ((a*b*c)%2 == 0 && a>b && b>c) {
        printf("The Number is Mystical\n");
    }
    else if (a==c) {
        printf ("The Number is Enigma \n");
    }
    else if (printf("This is an Ordinary number\n"))
        return 0;
}
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garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question4
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question4$ cd ..../Question4 && vim q4.c
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question4$ gcc q4.c
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question4$ ./a.out
Enter the 3 digit number:972
The Number is Mystical
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question4$ ./a.out
Enter the 3 digit number:279
This is an Ordinary number
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question4$ ./a.out
Enter the 3 digit number:555
The Number is Enigma
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question4$ ./a.out
Enter the 3 digit number:456
This Number is Magical
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question4$ ./a.out
Enter the 3 digit number:121
The Number is Enigma
garvmehta991@omnitrix-1000:~/25114035/Assignment4(2-4)/Question4$ █
```