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# Data Structure Lab

# Lab-2

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(2023-2024)

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**Q1.** WAP to take check if the triangle is valid or not. If the validity is established, do check if the triangle is isosceles, equilateral, right angle, or scalene. Take sides of the triangle as input from a user.

```c
#include <stdio.h>

void main()
{
    int side1, side2, side3;

    // User input for the sides of the triangle
    printf("Enter the side1 of the triangle: ");
    scanf("%d", &side1);
    printf("Enter the side2 of the triangle: ");
    scanf("%d", &side2);
    printf("Enter the side3 of the triangle: ");
    scanf("%d", &side3);

    // Checking for different types of triangles
    if (side1 == side2 && side2 == side3)
    {
        printf("Equilateral Triangle"); // All sides are equal
    }
    else if (side1 == side2 || side2 == side3 || side3 == side1)
    {
        printf("Isosceles Triangle"); // Two sides are equal
    }
    else if (side1 * side1 + side2 * side2 == side3 * side3 || side2 *
side2 + side3 * side3 == side1 * side1 || side3 * side3 + side1 * side1
== side2 * side2)
    {
        printf("Right Angle Triangle"); // Satisfies Pythagorean theorem
    }
    else if (side1 != side2 && side2 != side3 && side3 != side1)
    {
        printf("Scalene Triangle"); // All sides are different
    }
    else
    {
        printf("Invalid Triangle"); // Invalid input or sides cannot form
a triangle
    }
}
```

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```
PS D:\MCA\MCA-DSA\LAB-2> gcc .\Question1.c
PS D:\MCA\MCA-DSA\LAB-2> .\a.exe
Enter the side1 of the triangle: 10
Enter the side2 of the triangle: 10
Enter the side3 of the triangle: 20
Isosceles Triangle
PS D:\MCA\MCA-DSA\LAB-2> gcc .\Question1.c
PS D:\MCA\MCA-DSA\LAB-2> .\a.exe
Enter the side1 of the triangle: 30
Enter the side2 of the triangle: 30
Enter the side3 of the triangle: 30
Equilateral Triangle
PS D:\MCA\MCA-DSA\LAB-2>
```

**Q2.** WAP to compute the BMI Index of the person and print the BMI values as per the following ranges. You can use the following formula to compute BMI= weight(kgs)/Height(Mts)*Height(Mts).

| | BMI |
|---|---|
| Starvation | <15 |
| Anorexic | 15.1 to 17.5 |
| Underweight | 17.6 to 18.5 |
| Ideal | 18.6 to 24.9 |
| Overweight | 25 to 25.9 |
| Obese | 30 to 39.9 |
| Morbidity Obese | 40.0 above |

```c
#include <stdio.h>

void main()
{
    float height, weight, bmi;

    // User input for weight and height
    printf("Enter your weight in (kilograms): ");
    scanf("%f", &weight);
    printf("Enter your height in (meters): ");
    scanf("%f", &height);

    // Calculate BMI
    bmi = weight / (height * height);
```

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```
    // Display BMI value
    printf("Your BMI is: %.2f\n", bmi);

    // Categorize BMI into different groups
    if (bmi < 15)
        printf("Starvation"); // BMI less than 15
    else if (bmi >= 15.1 && bmi <= 17.5)
        printf("Anorexic"); // BMI between 15.1 and 17.5
    else if (bmi >= 17.6 && bmi <= 18.5)
        printf("Underweight"); // BMI between 17.6 and 18.5
    else if (bmi >= 18.6 && bmi <= 24.9)
        printf("Ideal"); // BMI between 18.6 and 24.9
    else if (bmi >= 25 && bmi <= 25.9)
        printf("Overweight"); // BMI between 25 and 25.9
    else if (bmi >= 30 && bmi <= 39.9)
        printf("Obese"); // BMI between 30 and 39.9
    else
        printf("Morbidity Obese"); // BMI greater than or equal to 40
}
```

```
PS D:\MCA\MCA-DSA\LAB-2> gcc .\Question2.c
PS D:\MCA\MCA-DSA\LAB-2> .\a.exe
Enter your weight in kilograms: 81
Enter your height in meters: 1.76
Your BMI is: 26.15
Morbidity Obese
```

**Q3.** WAP to check if three points (x1,y1), (x2,y2) and (x3,y3) are collinear or not.

```
#include <stdio.h>

int main()
{
    int x1, x2, x3, y1, y2, y3;

    // User input for the coordinates of three points
    printf("Enter the value of x1 and y1: ");
    scanf("%d %d", &x1, &y1);
    printf("Enter the value of x2 and y2: ");
    scanf("%d %d", &x2, &y2);
    printf("Enter the value of x3 and y3: ");
    scanf("%d %d", &x3, &y3);
```

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```
    // Calculate the value to check if the points are collinear
    int value = x1 * (y2 - y3) + x2 * (y3 - y1) + x3 * (y1 - y2);

    // Check if the value is zero to determine collinearity
    if (value == 0)
    {
        printf("Entered points are collinear"); // Points are collinear
if the value is zero
    }
    else
    {
        printf("Entered points are not collinear"); // Points are not
collinear if the value is not zero
    }

    return 0;
}
```

```
PS D:\MCA\MCA-DSA\LAB-2> gcc .\Question3.c
PS D:\MCA\MCA-DSA\LAB-2> .\a.exe
Enter the value of x1 and y1: 1 2
Enter the value of x2 and y2: 1 4
Enter the value of x3 and y3: 1 6
Entered points are collinear
PS D:\MCA\MCA-DSA\LAB-2>
```

**Q4.** According to the gregorian calendar, it was Monday on the date 01/01/01. If Any year is input through the keyboard write a program to find out what is the day on 1st January of this year.

```
#include <stdio.h>
void main()
{
    int year, daysInYear, daysOfName;
    printf("Enter the year :");
    scanf("%d", &year);
    daysInYear = year * 365;
    daysOfName = daysInYear % 7;
    if (daysOfName == 1)

        printf("Monday");

    else if (daysOfName == 2)
```

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```
        printf("Tuesday");
    else if (daysOfName == 3)
        printf("Wednesday");
    else if (daysOfName == 4)
        printf("Thrusday");
    else if (daysOfName == 5)
        printf("Friday");
    else if (daysOfName == 6)
        printf("Saturday");
    else if (daysOfName == 0)
        printf("Sunday");
    else
        printf("Invalid day");
}
```

```
PS D:\MCA\MCA-DSA\LAB-2> gcc .\Question4.c
PS D:\MCA\MCA-DSA\LAB-2> .\a.exe
Enter the year :2022
Saturday
PS D:\MCA\MCA-DSA\LAB-2> GCC .\Question4.c
PS D:\MCA\MCA-DSA\LAB-2> .\a.exe
Enter the year :2023
Sunday
PS D:\MCA\MCA-DSA\LAB-2>
```

**Q5.** WAP using ternary operator, the user should input the length and breadth of a rectangle, one has to find out which rectangle has the highest perimeter. The minimum number of rectangles should be three.

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```c
#include <stdio.h>

int main()
{
    // Declare variables to store dimensions and perimeters
    int len1, len2, len3, wid1, wid2, wid3;
    int per1, per2, per3;

    // Input dimensions of Rectangle 1
    printf("Enter the length and breadth of Rectangle 1: ");
    scanf("%d %d", &len1, &wid1);

    // Input dimensions of Rectangle 2
    printf("Enter the length and breadth of Rectangle 2: ");
    scanf("%d %d", &len2, &wid2);

    // Input dimensions of Rectangle 3
    printf("Enter the length and breadth of Rectangle 3: ");
    scanf("%d %d", &len3, &wid3);

    // Calculate perimeters for each rectangle
    per1 = 2 * (len1 + wid1);
    per2 = 2 * (len2 + wid2);
    per3 = 2 * (len3 + wid3);

    // Compare perimeters using ternary operators and print results
    (per1 > per2 && per1 > per3) ? printf("Rectangle 1 has the greater
perimeter\n") : (per2 > per3) ? printf("Rectangle 2 has the greater
perimeter\n")

                            : printf("Rectangle 3 has the greater
perimeter\n");

    return 0; // Return 0 to indicate successful program execution
}
```

```
PS D:\MCA\MCA-DSA\LAB-2> .\a.exe
Enter the length and breadth of Rectangle 1: 10 20
Enter the length and breadth of Rectangle 2: 30 40
Enter the length and breadth of Rectangle 3: 10 30
Rectangle 2 has the greater perimeter
PS D:\MCA\MCA-DSA\LAB-2>
```