C Lab assignment (Ex1 & Ex2)

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Question 1

Question

Anu's basic salary is the input. Her dearness allowance is 20% of basic salary and house rent is 20% of basic salary. Write a program to calculate her gross salary.

Code

```
// Anu's basic salary is the input. Her dearness allowance is 20% of
basic salary and house rent is 20% of basic salary. Write a program
to calculate her gross salary.
#include <stdio.h>

int main()
```

```c
{
    printf("Enter Anu's base salary: ");
    double base_salary;
    scanf("%lf", &base_salary);
    printf("\n");
    double da = base_salary * 0.2, hra = base_salary * 0.2; // 20% =>
0.2
    printf("Dearness allowance: %lf\n", da);
    printf("House rental allowance: %lf\n", hra);
    double gross_salary = base_salary + da + hra;
    printf("Gross salary: %lf\n", gross_salary);
}
```

Output

```
sanka@Sankalps-HP ~ OneDrive Documents .SEM4 CSE2010 - Advanced C Programming Lab Ex1
> gcc -o q1 q1.c
sanka@Sankalps-HP ~ OneDrive Documents .SEM4 CSE2010 - Advanced C Programming Lab Ex1
> ./q1
Enter Anu's base salary: 20000

Dearness allowance: 4000.000000
House rental allowance: 4000.000000
Gross salary: 28000.000000
sanka@Sankalps-HP ~ OneDrive Documents .SEM4 CSE2010 - Advanced C Programming Lab Ex1
>
```

Question 2

Question

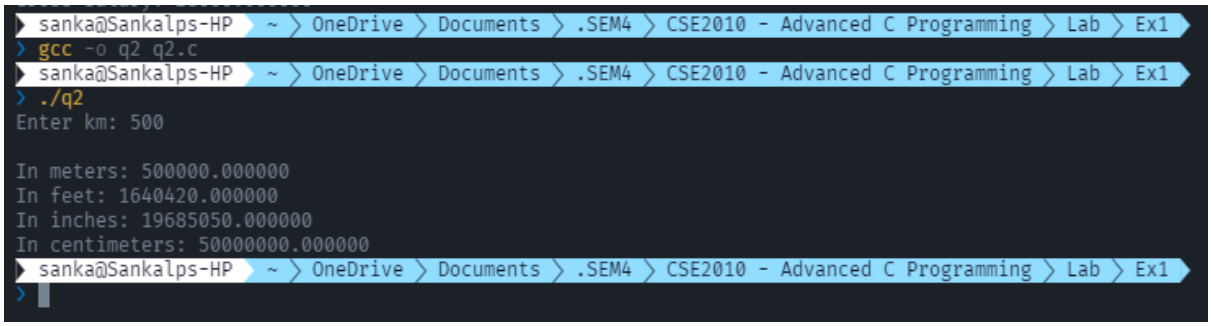
The distance between two cities (in km.) is the input. Write a program to convert and print the distance in meters, feet, inches and centimeters.

Code

```c
// The distance between two cities (in km.) is the input. Write a
program to convert and print the distance in meters, feet, inches and
centimeters.
#include <stdio.h>

int main()
{
    double km;
    printf("Enter km: ");
    scanf("%lf", &km);
    printf("\n");
    printf("In meters: %lf\n", km * 1000.0);
    printf("In feet: %lf\n", km * 3280.84);
    printf("In inches: %lf\n", km * 39370.1);
    printf("In centimeters: %lf\n", km * 100000.0);
}
```

Output



Question 3

Question

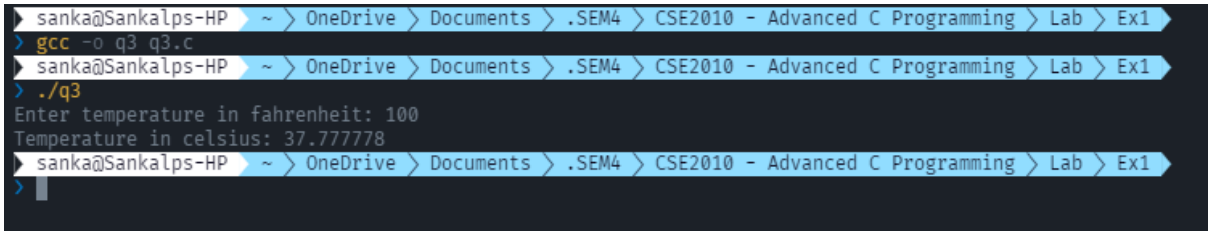
Temperature of city in Fahrenheit degrees is the input. Write a program to convert the temperature into centigrade degrees.

Code

```
//
Temperature of city in Fahrenheit degrees is the input. Writ
e a program to convert the temperature into centigrade degrees.
#include <stdio.h>

int main()
{
    double fahrenheit;
    printf("Enter temperature in fahrenheit: ");
    scanf("%lf", &fahrenheit);
    printf("Temperature in celsius: %lf", ((fahrenheit - 32.0) * 5.0)
/ 9.0);
}
```

Output



Question 4

Question

The length and breadth of a rectangle and radius of a circle are the inputs. Write a program to calculate the area and perimeter of the rectangle and the area and circumference of the circle.

Code

```
// The length and breadth of a rectangle and radius of a circle are the inputs. Write a program to calculate the area and perimeter of the rectangle and the area and circumference of the circle.
#include <stdio.h>

int main()
{
    double length, breadth, radius;
    printf("Enter the length and breadth of a rectangle and radius of a circle: \n");
    scanf("%lf", &length);
    scanf("%lf", &breadth);
    scanf("%lf", &radius);
    printf("Area of the rectangle: %lf\n", length * breadth);
    printf("Area of the circle: %lf\n", radius * radius * 3.14159);
    printf("Perimeter of the rectangle: %lf\n", 2 * length * breadth);
    printf("Perimeter of the circle: %lf\n", radius * 2 * 3.14159);
}
```

Output

```
sanka@Sankalps-HP ~ OneDrive Documents .SEM4 CSE2010 - Advanced C Programming Lab Ex1
> gcc -o q4 q4.c
sanka@Sankalps-HP ~ OneDrive Documents .SEM4 CSE2010 - Advanced C Programming Lab Ex1
> ./q4
Enter the length and breadth of a rectangle and radius of a circle:
5 4 7
Area of the rectangle: 20.000000
Area of the circle: 153.937910
Perimeter of the rectangle: 40.000000
Perimeter of the circle: 43.982260
sanka@Sankalps-HP ~ OneDrive Documents .SEM4 CSE2010 - Advanced C Programming Lab Ex1
>
```

Question 5

Question

Write a program to receive values of latitude(L1, L2) and longitude (G1, G2) in degrees, of two places on the earth and output the distance (D) between them in miles. The formula for distance in miles is:

$D = 3963 \cos^{-1} (\sin L1 \sin L2 + \cos L1 \cos L2 * \cos(G2-G1))$

Code

```
// Write a program to receive values of latitude(L1, L2) and longitude (G1, G2) in degrees, of two places on the earth and output the distance (D) between them in miles. The formula for distance in miles is:
// D = 3963 cos-1 (sin L1 sinL2+cos L1 cosL2*cos(G2-G1))

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

```c
int main()
{
    double L1, L2, G1, G2;
    printf("Enter L1, L2, G1, G2:\n");
    scanf("%lf%lf%lf%lf", &L1, &L2, &G1, &G2);
    double distance = 3963 * acos((sin(L1) * sin(L2)) + (cos(L1) *
cos(L2) * cos(G2 - G1)));
    printf("Distance between the two points is %lf miles\n",
distance);
}
```

Output

```
sanka@Sankalps-HP ~ OneDrive Documents .SEM4 CSE2010 - Advanced C Programming Lab Ex1
> gcc -o q5 q5.c
sanka@Sankalps-HP ~ OneDrive Documents .SEM4 CSE2010 - Advanced C Programming Lab Ex1
> ./q5
Enter L1, L2, G1, G2:
28.664837 28.647535 77.317851 77.306927
Distance between the two points is 79.469593 miles
sanka@Sankalps-HP ~ OneDrive Documents .SEM4 CSE2010 - Advanced C Programming Lab Ex1
>
```

Question 6

Question

Wind chill factor is the felt air temperature on exposed skin due to wind. The wind chill temperature is always lower than the air temperature and is calculated the following formula: $wcf = 35.74+0.6215t + (0.4275t - 35.75) * v^{0.16}$

Where t is the temperature and v is the wind velocity. Write a program to receive values of t and v and calculate wind chill factor.

Code

```c
// Wind chill factor is the felt air temperature on exposed skin due
to wind.  The wind chill
temperature is always lower than the air temperature and is
 calculated the following formula: wcf = 35.74+0.6215t + (0.4275t -
35.75) * v0.16 Where t is the temperature and v is the wind velocity.
Write a program to receive values of t and v and calculate wind chill
factor.
// wcf = 35.74+0.6215t + (0.4275t - 35.75) * v0.16
#include <stdio.h>
#include <math.h>

int main()
{
    double temperature, wind_velocity;
    printf("Enter temperature: ");
    scanf("%lf", &temperature);
    printf("Enter wind velocity: ");
```

```
    scanf("%lf", &wind_velocity);
    double wind_chill_factor = 35.74 + 0.6215 * temperature + (0.4275
* temperature - 35.75) * pow(wind_velocity, 0.16);
    printf("The wind chill factor is: %lf\n", wind_chill_factor);
}
```

Output

```
sanka@Sankalps-HP ~ OneDrive Documents .SEM4 CSE2010 - Advanced C Programming Lab Ex1
> gcc -o q6 q6.c
sanka@Sankalps-HP ~ OneDrive Documents .SEM4 CSE2010 - Advanced C Programming Lab Ex1
> ./q6
Enter temperature: 40
Enter wind velocity: 10
The wind chill factor is: 33.642548
sanka@Sankalps-HP ~ OneDrive Documents .SEM4 CSE2010 - Advanced C Programming Lab Ex1
>
```

Exercise 2

Question 1

Question

Write a program that accepts three sides of a triangle and check whether the triangle is valid or not. The triangle is valid if the sum of two sides is greater than the largest of the three sides.

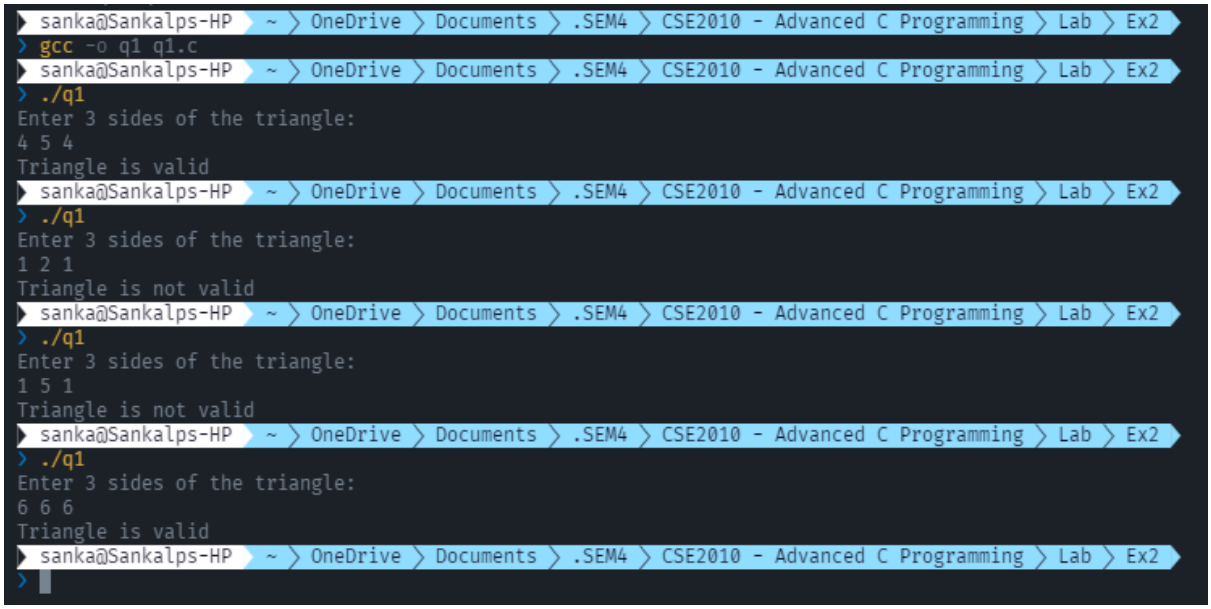
Code

```c
#include <stdio.h>

int main()
{
    int arr[3];
    printf("Enter 3 sides of the triangle:\n");
    scanf("%d%d%d", &arr[0], &arr[1], &arr[2]);
    // Finding the largest side
    int largest = 0;
    for (int i = 0; i < 3; i++)
    {
        if (arr[i] > arr[largest])
        {
            largest = i;
        }
    }
    // Summing the other 2 sides of the triangle
    int sum = 0;
    for (int i = 0; i < 3; i++)
    {
        if (i != largest)
        {
            sum += arr[i];
        }
    }
    // Checking sum vs largest side
    if (sum > arr[largest])
```

```
    {
        printf("Triangle is valid\n");
    }
    else
    {
        printf("Triangle is not valid\n");
    }
}
```

Output



Question 2

Question

Write a program to receive value of an angle in degrees and check whether sum of squares of sin and cosine of this angle is equal to 1.

Code

```
// Write a program to receive value of an angle in degrees and check
whether sum of squares of sin and cosine of this angle is equal to 1.
#include <stdio.h>
#include <math.h>

int main()
{
    double degrees;
    printf("Enter angle in degrees");
    scanf("%lf", &degrees);
    // Convert degrees to radians
    double radians = (degrees * M_PI) / 180.0;
    double sine_value = sin(radians) * sin(radians);
    double cosine_value = cos(radians) * cos(radians);
    printf("sine_value = %lf\n", sine_value);
    printf("cosine_value = %lf\n", cosine_value);
```

```
    printf("Total value = %lf\n", sine_value + cosine_value);
    if (sine_value + cosine_value == 1.0)
    {
        printf("Therefore sin^2 x + cos^2 x = 1 is proven.");
    }
}
```

Output

```
sanka@Sankalps-HP ~ OneDrive Documents .SEM4 CSE2010 - Advanced C Programming Lab Ex2
> gcc -o q2 q2.c
sanka@Sankalps-HP ~ OneDrive Documents .SEM4 CSE2010 - Advanced C Programming Lab Ex2
> ./q2
Enter angle in degrees45
sine_value = 0.500000
cosine_value = 0.500000
Total value = 1.000000
Therefore sin^2 x + cos^2 x = 1 is proven.
sanka@Sankalps-HP ~ OneDrive Documents .SEM4 CSE2010 - Advanced C Programming Lab Ex2
> ./q2
Enter angle in degrees90
sine_value = 1.000000
cosine_value = 0.000000
Total value = 1.000000
Therefore sin^2 x + cos^2 x = 1 is proven.
```

Question 3

Question

Write a program that receives weight as input and prints out the boxer's weight class. In boxing the weight class of a boxer is decided as per the following table.

Boxer Class	Weight in pounds
Fly weight	<115
Bantam weight	115 -121
Featherweight	122-153
Middleweight	154-189
Heavyweight	>=190

Code

```
// Write a program that receives weight as input and prints out the
boxer's weight class. In boxing the weight class of a boxer is
decided as per the following table.
#include <stdio.h>

int main()
{
    printf("Enter boxer's weight: ");
    double weight;
    scanf("%lf", &weight);
    if (weight < 115)
    {
        printf("Fly weight\n");
    }
    else if (weight <= 121)
    {
        printf("Bantam weight\n");
    }
```

```
    else if (weight <= 153)
    {
        printf("Feather weight\n");
    }
    else if (weight <= 189)
    {
        printf("Middle weight\n");
    }
    else
    {
        printf("Heavy weight\n");
    }
}
```

Output

```
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
> gcc -o q3 q3.c
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
> ./q3
Enter boxer's weight: 100
Fly weight
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
> ./q3
Enter boxer's weight: 120
Bantam weight
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
> ./q3
Enter boxer's weight: 130
Feather weight
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
> ./q3
Enter boxer's weight: 160
Middle weight
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
> ./q3
Enter boxer's weight: 200
Heavy weight
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
>
```

Question 4

Question

Write a program that accepts month and date of birth as input and prints the corresponding zodiac sign based on the following table:

Sun sign	From - to
Capricorn	Dec 22 – jan19
Auarius	Jan 20 – feb 17
Pisces	Feb 18 – Mar 19
Aries	Mar 20 – Apr 19
Taurus	April 20 – May 20
Gemini	May 21 – Jun 20
Cancer	Jun 21 – Jul 22
Leo	Jul 23 – Aug 22
Virgo	Aug 23 – Sep 22
Libra	Sep 23 – Oct 22
Scorpio	Oct 23 – Nov 21
Sagittarius	Nov 22 – Dec 21

Code

```c
// Write a program that accepts month and date of birth as input and
prints the corresponding zodiac sign based on the following table:
#include <stdio.h>

int main()
{
    int date, month;
    printf("Enter month (1-12): ");
    scanf("%d", &month);
    // months with 31 days
    if (month == 1 || month == 3 || month == 5 || month == 7 || month
== 8 || month == 10 || month == 12)
    {
        printf("Enter date (1-31):");
    }
    else if (month == 2)
    {
        printf("Enter date (1-29):");
    }
    else
    {
        printf("Enter date (1-30):");
    }

    scanf("%d", &date);
    switch (month)
    {
    case 1:
        if (date <= 19)
        {
            printf("Capricorn");
        }
        else
        {
            printf("Aquarius");
        }
        break;
    case 2:
        if (date <= 17)
        {
            printf("Aquarius");
        }
        else
        {
            printf("Pisces");
        }
        break;
```

```
    case 3:
        if (date <= 19)
        {
            printf("Pisces");
        }
        else
        {
            printf("Aries");
        }
        break;
    case 4:
        if (date <= 20)
        {
            printf("Aries");
        }
        else
        {
            printf("Taurus");
        }
        break;
    case 5:
        if (date <= 20)
        {
            printf("Taurus");
        }
        else
        {
            printf("Gemini");
        }
        break;
    case 6:
        if (date <= 20)
        {
            printf("Gemini");
        }
        else
        {
            printf("Cancer");
        }
        break;
    case 7:
        if (date <= 22)
        {
            printf("Cancer");
        }
        else
        {
            printf("Leo");
```

```
        }
        break;
    case 8:
        if (date <= 22)
        {
            printf("Leo");
        }
        else
        {
            printf("Virgo");
        }
        break;
    case 9:
        if (date <= 22)
        {
            printf("Virgo");
        }
        else
        {
            printf("Libra");
        }
        break;
    case 10:
        if (date <= 22)
        {
            printf("Libra");
        }
        else
        {
            printf("Scorpio");
        }
        break;
    case 11:
        if (date <= 21)
        {
            printf("Scorpio");
        }
        else
        {
            printf("Saggitarius");
        }
        break;
    case 12:
        if (date <= 21)
        {
            printf("Saggitarius");
        }
        else
```

```
        {
            printf("Capricorn");
        }
        break;
    default:
        printf("Invalid month");
    }
    printf("\n");
}
```

Output

```
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
> gcc -o q4 q4.c
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
> ./q4
Enter month (1-12): 1
Enter date (1-31):1
Capricorn
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
> ./q4
Enter month (1-12): 2
Enter date (1-29):1
Aquarius
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
> ./q4
Enter month (1-12): 3
Enter date (1-31):1
Pisces
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
> ./q4
Enter month (1-12): 4
Enter date (1-30):1
Aries
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
> ./q4
Enter month (1-12): 5
Enter date (1-31):1
Taurus
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
> ./q4
Enter month (1-12): 6
Enter date (1-30):1
Gemini
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
> ./q4
Enter month (1-12): 7
Enter date (1-31):1
Cancer
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
> ./q4
Enter month (1-12): 8
Enter date (1-31):1
Leo
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
> ./q4
Enter month (1-12): 9
Enter date (1-30):1
Virgo
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
> ./q4
Enter month (1-12): 10
Enter date (1-31):1
Libra
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
> ./q4
Enter month (1-12): 11
Enter date (1-30):1
Scorpio
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
>
```

```
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
> ./q4
Enter month (1-12): 12
Enter date (1-31):1
Saggitarius
sanka@Sankalps-HP ~ > OneDrive > Documents > .SEM4 > CSE2010 - Advanced C Programming > Lab > Ex2
>
```

Question 5

Question

Write a program to read ten numbers and count number of positive, negative and zero.

Code

```c
// Write a program to read ten numbers and count number of positive, negative and zero.
#include <stdio.h>

int main()
{
    int number;
    int positive = 0, negative = 0, zero = 0;
    for (int i = 0; i < 10; i++)
    {
        scanf("%d", &number);
        if (number < 0)
        {
            negative++;
        }
        else if (number > 0)
        {
            positive++;
        }
        else
        {
            zero++;
        }
    }
    printf("Number of positives: %d\n", positive);
    printf("Number of negatives: %d\n", negative);
    printf("Number of zeroes: %d\n", zero);
}
```

Output

```
sanka@Sankalps-HP ~ OneDrive Documents .SEM4 CSE2010 - Advanced C Programming Lab Ex2
> gcc -o q5 q5.c
sanka@Sankalps-HP ~ OneDrive Documents .SEM4 CSE2010 - Advanced C Programming Lab Ex2
> ./q5
1 1 1 -1 -1 -1 -1 0 0 0
Number of positives: 3
Number of negatives: 4
Number of zeroes: 3
sanka@Sankalps-HP ~ OneDrive Documents .SEM4 CSE2010 - Advanced C Programming Lab Ex2
>
```

Question 6

Question

Evaluate the following series. Use do –while, for and while loop.

i) 1+3+5+7.....n

ii) 1+4+25+36....n

iii) $x+x^2/2! +x^3/3!+.....+n$

Code

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

int main()
{
    // User input
    int n;
    printf("Enter value of n:");
    scanf("%d", &n);
    // i) 1+3+5+7+...n
    int i, sum = 0;
    for (i = 1; i <= n; i += 2)
    {
        sum += i;
    }

    printf("1+3+5+7+...n: %d\n", sum);

    // 1+4+25+36....n
    sum = 0;
    i = 1;
    while (pow(i, 2) <= n)
    {
        sum += (int)pow(i, 2);
        i++;
        if (pow(i, 2) <= n)
        {
            sum += (int)pow(i, 2);
            i++;
        }
        i += 2;
    }

    printf("1+4+25+36....n: %d\n", sum);

    // x+x^2/2! +x^3/3!+.....+x^n/n!
    double sumd = 0;
    i = 1;
    printf("Enter value of x: ");
    int x;
    scanf("%d", &x);
    while (i <= n)
    {
        int key = i, j = 1;
        double fact = 1.0;
        do
        {
```

```
            fact *= (double)j;
            j++;
        } while (j <= key);

        sumd += pow(x, i) / fact;
        i++;
    }

    printf("x+x^2/2! +x^3/3!+.....+x^n/n!: %lf", sumd);
}
```

Output