Training-23-Dec-2024

While loop

Q1

```
#include <stdio.h>
int main() {
   int i=0,n,count;

  while(i<=50)
  {

     printf("%d\n",2*i);
     i++;
     count++;

  }
  printf("No: of even numbers = %d\n",count);



   return 0;
}
```

Q2

```
#include <stdio.h>
int main() {
   int start, end;
   int i;
   int count = 0;
   printf("Enter the start of the range: ");
   scanf("%d", &start);
```

```
    printf("Enter the end of the range: ");
    scanf("%d", &end);
    i = start;
    printf("Even numbers between %d and %d:\n", start, end);
    while (i <= end) {
        if (i % 2 == 0) {
            printf("%d\n", i);
            count++;
        }
        i++;
    }
    printf("Number of even numbers = %d\n", count);
    return 0;
}
```

Q3 **Print Natural Numbers:**

Write a program to print the first 10 natural numbers using a while loop.

```
#include<stdio.h>
int main()
{
    int n,i=1;
    printf("First 10 natural numbers\n");
    while(i<=10)
    {
        printf("%d\n",i++);
    }
}
```

Q4 **Sum of Digits:**

Write a program to calculate the sum of the digits of a given integer using a while loop.

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

```
int main() {
    int num, sum = 0, digit;
    printf("Enter an integer: ");
    scanf("%d", &num);
    if (num > 0) {
        num = -num;
    }

    while (num > 0) {
        digit = num % 10;
        sum += digit;
        num /= 10;
    }
    printf("Sum of the digits: %d\n", sum);
    return 0;
}
```

Q5 **Factorial of a Number:**

Write a program to compute the factorial of a number using a while loop.

```
#include <stdio.h>

int main() {
    int num, factorial = 1, i;

    printf("Enter a positive integer: ");
    scanf("%d", &num);

    if (num < 0) {
        printf("Factorial is not defined for negative numbers.\n");
        return 1;
    }
```

```
    i = num;
    while (i > 0) {
        factorial *= i;
        i--;
    }
    printf("Factorial of %d is %d\n", num, factorial);
    return 0;
}
```

Q6 **Reverse a Number:**

Write a program to reverse a given number using a while loop.

```
#include <stdio.h>
int main() {
    int num, reverse= 0, digit;
    printf("Enter an integer: ");
    scanf("%d", &num);

    while (num != 0) {
        digit = num % 10;
        reverse = reverse * 10 + digit;
        num /= 10;
    }
    printf("Reversed number: %d\n", reverse);
    return 0;
}
```

Q7 **Count Digits in a Number:**

Write a program to count the number of digits in an integer using a while loop.

```
#include <stdio.h>

int main() {
```

```
    int num, count = 0;
    printf("Enter an integer: ");
    scanf("%d", &num);
    if (num == 0) {
        count = 1;
    } else {

        while (num != 0) {
            num /= 10;
            count++;
        }
    }
    printf("Number of digits: %d\n", count);
    return 0;
}
```

Q8 **Print Multiplication Table:**

Write a program to print the multiplication table of a given number using a while loop.

```
#include<stdio.h>
int main()
{
    int n,i=0,mul;
    printf("Enter a number");
    scanf("%d",&n);
    if(n>0){
            while(i<=10)
    {
```

```
        mul=n*i;
        printf("%d*%d=%d\n",i,n,mul);
        i++;
    }
    }
    else
        printf("Enter a valid integer");
    return 0;
}
```

Q9 **Check Palindrome Number:**

Write a program to check if a number is a palindrome using a while loop.

```
#include<stdio.h>
int main()
{
    int i,n,reverse=0,digit;
    printf("Enter a number\n");
    scanf("%d",&n);
    i=n;
    while(i!=0)
    {
        digit=i%10;
        reverse=reverse*10+digit;
        i=i/10;
    }
    printf("Palindrome of %d is %d",n,reverse);
    return 0;
```

```
}
```

Q10 **Print Odd Numbers:**

Write a program to print all odd numbers between 1 and 50 using a while loop

```
#include <stdio.h>

int main() {

   int i = 1, count = 0;

   while (i <= 50) {

      printf("%d\n", i);

      i += 2;

      count++;

   }

   printf("No: of odd numbers = %d\n", count);

   return 0;

}
```

Q11 **Sum of Series:**

Write a program to calculate the sum of the series:

$$S=1+2+3+\ldots+n$$

using a while loop.

```
#include <stdio.h>


int main() {

   int n, sum = 0, i = 1;

   printf("Enter a positive integer n: ");

   scanf("%d", &n);


   if (n <= 0) {
```

```
        printf("Enter a positive integer.\n");
        return 1;
    }

    while (i <= n) {
        sum += i;
        i++;
    }

    printf("Sum of the series 1 + 2 + ... + %d = %d\n", n, sum);

    return 0;
}
```

Q12 **Find GCD of Two Numbers:**

Write a program to compute the GCD of two numbers using a while loop.

```
#include <stdio.h>
int main() {
    int num1, num2, gcd;
    printf("Enter two integers: ");
    scanf("%d %d", &num1, &num2);
    if (num1 <= 0 || num2 <= 0) {
        printf("Please enter positive integers.\n");
        return 1;
    }
```

```
    while (num1 != num2) {
        if (num1 > num2) {
            num1 = num1 - num2;
        } else {
            num2 = num2 - num1;
        }
    }
    gcd = num1;
    printf("GCD of the two numbers is: %d\n", gcd);
    return 0;
}
```

Set 2 FOR LOOP

Q1 **Print Even Numbers:**

Write a program to print all even numbers between 1 and 100 using a for loop.

```
#include <stdio.h>
int main() {
    int count;
    for (int i=1; i <= 100; i++) {
        if (i % 2 == 0) {
            printf("%d ", i);
            count++;
        }
    }
    printf("\nNo:of even numbers =%d",count);
    return 0;
```

```
}
```

Q2 **Sum of First N Natural Numbers:**

Write a program to calculate the sum of the first n natural numbers using a for loop.

```
#include<stdio.h>

int main()

{

   int n,sum=0;

   printf("Enter n:\n");

   scanf("%d",&n);

   if(n>=0){

      for(int i=1;i<=n;i++)

   {

       sum+=i;

   }

   printf("Sum of first %d numbers = %d",n,sum);

   }

   else

   printf("Enter a natural number\n");

   return 0;

}
```

Q3 **Factorial of a Number:**

Write a program to calculate the factorial of a given number using a for loop.

```
#include<stdio.h>

int main()

{

   int n,factorial=1;

   printf("Enter n:\n");
```

```
    scanf("%d",&n);
    if(n>0){
       for(int i=1;i<=n;i++)
    {
        factorial=i*factorial;
    }
    printf("%d! = %d",n,factorial);
    }
    else if(n==0)
    printf("0!=1\n");
    else
    printf("Enter a positive number\n");
    return 0;
}
```

Q4 **Fibonacci Series:**

Write a program to generate the first nnn terms of the Fibonacci series using a for loop.

```
#include<stdio.h>
int main() {
    int n, first = 0, second = 1, next;

    printf("Enter n:\n");
    scanf("%d", &n);

    if (n >= 0) {

        for (int i = 1; i <= n; i++) {
```

```
            if (i == 1)
                printf("%d,", first);
            else if (i == 2)
                printf("%d,", second);
            else {
                next = first + second;
                printf("%d,", next);
                first = second;
                second = next;
            }
        }
    }
else {
        printf("Enter a positive number\n");
    }
    return 0;
}
```

Q5 **Prime Number Check:**

Write a program to check if a given number is prime using a for loop.

// A **prime number** is a natural number greater than 1 that has exactly two divisors: 111 and itself. This means it cannot be divided evenly by any number other than 111 and itself.

```
#include <stdio.h>

int main() {
    int num, prime = 1;
    printf("Enter a number: ");
    scanf("%d", &num);
```

```
    if (num <= 1) {
        printf("%d is not a prime number.\n", num);
        return 0;
    }
    for (int i = 2; i <= num / 2; i++) {
        if (num % i == 0) {
            prime = 0;
            break;
        }
    }
    if (prime)
        printf("%d is a prime number.\n", num);
    else
        printf("%d is not a prime number.\n", num);

    return 0;
}
```

Q6 **Pattern Printing:**

Print the following pattern using a for loop:

```
*
**
***
```

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

```
int main() {
    int n;
    printf("Enter the number of rows: ");
    scanf("%d", &n);

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

        for (int j = 1; j <= i; j++) {
            printf("*");
        }
        printf("\n");
    }

    return 0;
}
```

Q7 **Sum of Squares of Numbers:**

Write a program to calculate the sum of squares of the first nnn natural numbers using a for loop.

```
#include <stdio.h>
int main() {
    int n, sum = 0;

    printf("Enter the value of n: ");
    scanf("%d", &n);
```

```
    for (int i = 1; i <= n; i++) {
        sum += i * i;
    }
    printf("The sum of squares of the first %d natural numbers is: %d\n", n, sum);
    return 0;
}
```

Q8 **Power of a Number:**

Write a program to compute (x raised to the power y) using a for loop.

```
#include<stdio.h>
int main()
{
    int n,power;
    long long result=1;
    printf("Enter number\n");
    scanf("%d",&n);
    printf("Enter the power\n");
    scanf("%d",&power);
    for(int i=1;i<=power;i++)
    {
      result=result*n;
    }
    printf("%d power of %d = %lld\n",n,power,result);
}
```

Q9 **Reverse Counting:**

Write a program to print numbers from 100 to 1 in reverse order using a for loop.

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

```
int main()
{
    for(int i=100;i>=1;i--)
    {
       printf("%d,",i);
    }
   return 0;
}
```

Q10 **Count Divisors of a Number:**

Write a program to count the divisors of a given number using a for loop.

```
#include <stdio.h>


int main() {
    int num, count = 0;
    printf("Enter a number: ");
    scanf("%d", &num);
    printf("Divisors:\n");
    for (int i = 1; i <= num; i++) {
        if (num % i == 0) {
            printf("%d,",i);
            count++;
        }
    }
    printf("\nThe number of divisors of %d is: %d", num, count);
    return 0;
}
```

Do-While Loop

Q1 **Menu-Driven Calculator:**
Write a menu-driven calculator using a do-while loop. Continue asking for user input until they choose to exit.

```
#include <stdio.h>

int main()

{

   int choice;

   float n1,n2;

   do

   {

      printf("\n1. Add\n");

      printf("2. Subtract\n");

      printf("3. Multiply\n");

      printf("4. Divide\n");

      printf("5. Exit\n");

      printf("Enter your choice (1-5): ");

      scanf("%d", &choice);

      if (choice == 5) {

         printf("Exit\n");

         break;

      }

      printf("Enter two numbers: ");

      scanf("%f %f", &n1, &n2);

      switch(choice)

      {
```

```
        case 1:
        printf("%f+%f=%f",n1,n2,n1+n2);
        break;

        case 2:
        printf("%f-%f=%f",n1,n2,n1-n2);
        break;

        case 3:
        printf("%f*%f=%f",n1,n2,n1*n2);
        break;

        case 4:
        {
           if(n2!=0)
           printf("%f/%f=%f",n1,n2,n1/n2);
           else
           printf("Invalid n2\n");
        break;
        }
        default:
        printf("Invalid choice\n");

    }
}while(1);
```

```
    return 0;

}
```

Q2 **Print Numbers Until Zero:**

Write a program to keep accepting numbers from the user and print them until the user enters zero.

```
#include <stdio.h>

int main() {

    int n;

    do {

        printf("\nEnter a number (enter 0 to stop): ");

        scanf("%d", &n);

        if (n!= 0) {

            printf( "Value=%d", n);

        }



    } while (n != 0);

    printf("Terminated.\n");

    return 0;

}
```

Q3 **Validate Password:**

Write a program that asks for a password until the user provides the correct one using a do-while loop.

```
#include <stdio.h>

#include <string.h>

int main() {

    char password[50];
```

```
    const char correct_password[] = "5678a";
    do {
        printf("\nEnter password: ");
        scanf("%s", password);
        if (strcmp(password, correct_password) != 0) {
            printf("Incorrect password. Please try again.\n");
        }
    } while (strcmp(password, correct_password) != 0);
    printf("Password correct\n");
    return 0;
}
```

Q4 **Sum of Positive Numbers:**

Write a program to read integers from the user and compute their sum. Stop when the user enters a negative number.

```
#include <stdio.h>
int main() {
    int num, sum = 0;
    do {
        printf("Enter a number: ");
        scanf("%d", &num);
        if (num >= 0) {
            sum += num;
        }
    } while (num >= 0);
    printf("The sum of the positive numbers entered is: %d\n", sum);
    return 0;
```

```
}
```

Q5 **Repeat Multiplication Table:**

Write a program to repeatedly display the multiplication table of a number until the user decides to stop.

```
#include <stdio.h>

int main() {

   int number, i, choice;

   do {

      printf("Enter a number to display its multiplication table: ");

      scanf("%d", &number);

      for (i = 1; i <= 10; i++) {

         printf("%d x %d = %d\n", number, i, number * i);

      }

      printf("\nDo you want to see the multiplication table of another number? (1 for yes, 0 for no): ");

      scanf("%d", &choice);

   } while (choice == 1);

   return 0;

}
```

Q6 **Guess the Number Game:**

Write a program where the user guesses a predefined number. Continue the game until the correct number is guessed.

```
#include <stdio.h>

int main() {

   int hide_number = 5678;

   int guess;



   do {
```

```
        printf("Guess the number: ");
        scanf("%d", &guess);
        if (guess == hide_number)  {
            printf("Guessed the correct number!\n");
        }
        else
        printf("Try again\n");
    } while (guess != hide_number);
    return 0;
}
```

Q7 **Input Validation:**

Write a program to ensure that the user enters a number between 1 and 10. Prompt until a valid number is provided.

```
#include <stdio.h>
int main() {
    int num;
    do {
        printf("Enter a number: ");
        scanf("%d", &num);

        if (num < 1 || num > 10) {
            printf("Invalid input.\n");
        }

    } while (num < 1 || num > 10);
    printf("You entered a valid number: %d\n", num);
```

```
    return 0;
}
```

Q8 **Calculate Average:**

Write a program to calculate the average of a series of numbers entered by the user. Stop when the user enters zero.

```
#include <stdio.h>

int main() {
    int num;
    int sum = 0;
    int count = 0;
    float average;
    do {
        printf("Enter a number: ");
        scanf("%d", &num);

        if (num != 0) {
            sum += num;
            count++;
        }
    } while (num != 0);
    if (count > 0) {
        average = (float)sum / count;
        printf("The average of the numbers entered is: %.2f\n", average);
    } else {
        printf("No numbers were entered.\n");
    }
```

```
    return 0;
}
```

Q9 **Print Alphabets:**

Write a program to print lowercase alphabets from 'a' to 'z' using a do-while loop.

```
#include <stdio.h>
int main() {
    char letter = 'a';
    do {
        printf("%c ", letter);
        letter++;
    } while (letter <= 'z');

    return 0;
}
```

Q10 **Count Digits of a Number:**

Write a program to count the number of digits in a number entered by the user using a do-while loop.

```
#include <stdio.h>
int main() {
    int number, count = 0;
    printf("Enter a number: ");
    scanf("%d", &number);
    number = (number < 0) ? -number : number;
    do {
        count++;
        number /= 10;
```

```
    } while (number > 0);

    printf("The number of digits is: %d\n", count);

  return 0;

}
```

Problem statements with respect to Pattern printing using For as well as while Loop

Q1 Pascal's Triangle

```
    1
   1 1
  1 2 1
1 3 3 1
1 4 6 4 1
```

```
#include <stdio.h>

int main() {

    int n = 5;

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

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

            printf(" ");

        int val = 1;

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

            printf("%d ", val);

            val = val * (i - k) / (k + 1);

        }

        printf("\n");

    }

    return 0;

}
```

Q2 2. Binary Pattern

1
01
101
0101
10101

```
#include <stdio.h>


int main() {
    int n = 5;
    int i, j;
    for (i = 1; i <= n; i++) {
        for (j = 1; j <= i; j++) {
            if ((i + j) % 2 == 0) {
                printf("1");
            } else {
                printf("0");
            }
        }
        printf("\n");
    }


    return 0;
}
```

Q3 3. Floyd’s Triangle (Numbers)

1
2 3
4 5 6

7 8 9 10
11 12 13 14 15

```
#include <stdio.h>

int main() {

    int n = 5;

    int num = 1;

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


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

            printf("%d ", num);

            num++;

        }

        printf("\n");

    }


    return 0;

}
```

Q4 4. Inverted Right-Angled Triangle (Numbers)

12345
1234
123
12
1

```
#include <stdio.h>

int main() {

    int n = 5;

    for (int i = n; i >= 1; i--) {
```

```
        for (int j = 1; j <= i; j++) {
            printf("%d", j);
        }
        printf("\n");
    }

    return 0;
}
```

Q5 5. Diamond (Stars)

```
    *
   ***
  *****
*******
*********
*******
  *****
   ***
    *
```

```
#include <stdio.h>

int main() {
    int n = 5;

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

        for (int j = 1; j <= n - i; j++) {
            printf(" ");
```

```
        }

        for (int j = 1; j <= (2 * i - 1); j++) {
            printf("*");
        }
        printf("\n");
    }
    for (int i = n - 1; i >= 1; i--) {
        for (int j = 1; j <= n - i; j++) {
            printf(" ");
        }

        for (int j = 1; j <= (2 * i - 1); j++) {
            printf("*");
        }

        printf("\n");
    }

    return 0;
}
```

Q6 Inverted Pyramid (Stars)

```
*********
*******
 *****
```

```
  ***
   *
#include <stdio.h>
int main() {
    int n = 5;
    for (int i = 0; i < n; i++) {

        for (int j = 0; j < i; j++) {
            printf(" ");
        }
        for (int j = 0; j < 2 * (n - i) - 1; j++) {
            printf("*");
        }
        printf("\n");
    }
    return 0;
}
```