1. WAP which prints 1 to 10 using ‘while’ loop.

```
#include<stdio.h>
void main()
{
   int i=0;
   while(i<=10)
      printf("%d\n",i++);
   printf("Out of the loop body\n");
}
```

O/P:

```
0
1
2
3
4
5
6
7
8
9
10
```

2. WAP using while loop to print all the even numbers between 0 to 100. Also count and print how many even numbers are present. Later take user inputs for boundaries.

```
#include<stdio.h>
void main()
{
   int s,e,c=0;
   printf("Enter the range between numbers:\n");
   scanf("%d %d",&s,&e);
   while(s<=e)
   {
      if(s%2==0)
      {
         printf("%d\n",s);
         c++;
      }
      s++;
   }
   printf("Count=%d\n",c);
   printf("Out of the loop body\n");
}
```

O/P:

```
Enter the range between numbers:
5 10
6
8
```

10

Count=3

Out of the loop body

While Loop

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

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

O/P:

First 10 natural numbers:

1 2 3 4 5 6 7 8 9 10

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

```
#include <stdio.h>
void main()
{
   int n,s=0,d,t;
   printf("Enter the number:\n");
   scanf("%d",&n);
   t=n;
   if(n<0)
      n=-n;
   while(n>0)
   {
      d=n%10;
      s+=d;
      n/=10;
   }
   printf("Sum of the digits is: %d\n",s);
}
```

O/P:

```
Enter the number:
158
Sum of the digits is: 14
```

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

```
#include <stdio.h>
void main()
```

```
{
  int num,fact=1,i;
  printf("Enter the number:\n");
  scanf("%d",&num);
  if(num < 0)
  {
     printf("Enter a positive number\n");
     return 1;
  }
  i=num;
  while(i>0)
  {
     fact*= i;
     i--;
  }
  printf("The factorial of %d is: %d\n",num,fact);
}
```

O/P:

```
Enter the number:
5
The factorial of 5 is: 120

Enter the number:
-3
Enter a positive number
```

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

```
#include <stdio.h>
void main()
{
   int num,r=0,num1,d,n;
   printf("Enter the number:\n");
   scanf("%d",&num);
   num1=num;
   n=0;
   if(num<0)
   {
      n=1;
      num=-num;
   }
   while(num>0)
   {
      d=num%10;
      r=r*10+d;
      num/=10;
   }
   if(n)
      r=-r;
   printf("The reverse of %d is: %d\n",num1,r);
}
```

O/P:

Enter the number:

36

The reverse of 36 is: 63

Enter the number:

-15

The reverse of -15 is: -51

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

```
#include <stdio.h>
void main()
{
   int num,count=0;
   printf("Enter the number:\n");
   scanf("%d",&num);
   if(num<0)
      num=-num;
   if(num==0)
      count=1;
   else
   {
      while(num>0)
      {
         num/=10;
         count++;
```

```
        }
    }
    printf("Count=%d\n",count);
}
```

O/P:

```
Enter the number:
12545
Count=5

Enter the number:
12504
Count=5

Enter the number:
-2546
Count=4
```

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

```
#include <stdio.h>
void main()
{
    int n,i=1;
    printf("Enter the number:\n");
    scanf("%d",&n);
```

```
    while (i <= 10)
    {
        printf("%d x %d = %d\n",n,i,n*i);
        i++;
    }
}
```

O/P:

```
Enter the number:
5
5 x 1 = 5
5 x 2 = 10
5 x 3 = 15
5 x 4 = 20
5 x 5 = 25
5 x 6 = 30
5 x 7 = 35
5 x 8 = 40
5 x 9 = 45
5 x 10 = 50
```

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

```
#include <stdio.h>
void main()
{
    int n,n1,r=0,d;
```

```
    printf("Enter the number:\n");
    scanf("%d",&n);
    n1=n;
    if(n<0)
    {
        printf("Not a palindrome number(negative)\n");
        return 1;
    }
    while(n>0)
    {
        d=n%10;
        r=r*10+d;
        n/=10;
    }
    if(n1==r)
        printf("Palindrome number\n");
    else
        printf("Not a palindrome number\n");
}
```

O/P:

```
Enter the number:
181
Palindrome number

Enter the number:
-561
```

Not a palindrome number(negative)

Enter the number:

657

Not a palindrome number

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

```
#include <stdio.h>
void main()
{
   int i=1;
   while(i<=50)
   {
      if(i%2!=0)
         printf("%d ",i);
      i++;
   }
  printf("\n");
}
```

O/P:

1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49

9. Write a program to calculate the sum of the series: S=1+2+3+…+n using a while loop.

```
#include <stdio.h>
void main()
{
   int n,s=0,n1=1;
   printf("Enter the number:\n");
   scanf("%d",&n);
   while(n1<=n)
   {
      s+=n1;
      n1++;
   }
   printf("Sum of digits: %d\n",s);
}
```

O/P:

```
Enter the number:
5
Sum of digits: 15
```

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

```
#include <stdio.h>
void main()
{
   int n1,n2;
   printf("Enter the two numbers:\n");
   scanf("%d %d",&n1,&n2);
```

```
    if(n1<=0 || n2<=0)
    {
        printf("Enter a positive number\n");
        return 1;
    }
    while(n1!=n2)
    {
        if(n1>n2)
            n1=n1-n2;
        else
            n2=n2-n1;
    }
    printf("GCD of the two numbers is: %d\n",n1);
}
```

O/P:

```
Enter the two numbers:
8 12
GCD of the two numbers is: 4

Enter the two numbers:
5 -2
Enter a positive number
```

For Loop

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

```
#include <stdio.h>
void main()
{
   int i;
   for(i=1;i<=100;i++)
   {
      if (i%2==0)
         printf("%d ",i);
   }
   printf("\n");
}
```

O/P:

2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82 84 86 88 90 92 94 96 98 100

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

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

```
    printf("Enter the number:\n");
    scanf("%d",&n);
    for(i=1;i<=n;i++)
        s+=i;
    printf("Sum of the first %d natural numbers is: %d\n",n,s);
}
```

O/P:

```
Enter the number:
5
Sum of the first 5 natural numbers is: 15
```

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

```
#include <stdio.h>
void main()
 {
    int num,fact=1,i;
    printf("Enter the number:\n");
    scanf("%d",&num);
    if(num < 0)
    {
        printf("Enter a positive number\n");
        return 1;
    }
    i=num;
```

```
    for(i=1;i<=num;i++)
        fact*=i;
    printf("The factorial of %d is: %d\n",num,fact);
}
```

O/P:

```
Enter the number:
6
The factorial of 6 is: 720
```

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

```
#include<stdio.h>
void main()
{
    int a=0,b=1,c,n,i;
    printf("Enter the number of terms:\n");
    scanf("%d",&n);
    printf("%d %d ",a,b);
    for(i=3;i<=n;i++)
    {
        c=a+b;
        printf("%d ",c);
        a=b;
        b=c;
    }
    printf("\n");
```

```
}
```

O/P:

```
Enter the number of terms:
5
0 1 1 2 3
```

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

```
#include<stdio.h>
void main()
{
   int n,i;
   printf("Enter the number:\n");
   scanf("%d",&n);
   for(i=2;i<n;i++)
   {
      if(n%i==0)
         break;
   }
   if(n==i)
      printf("Prime number\n");
   else
      printf("Not a prime number\n");
}
```

O/P:

Enter the number:

5

Prime number

Enter the number:

8

Not a prime number

6. Print the following pattern using a for loop:

*

**

***

****

```
#include<stdio.h>
void main()
{
   int i,j,r;
   printf("Enter the number of rows:\n");
   scanf("%d",&r);
   for(i=0;i<r;i++)
   {
      for(j=0;j<=i;j++)
         printf("*");
      printf("\n");
   }
}
```

O/P:

Enter the number of rows:

4

*

**

***

****

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

```
#include <stdio.h>
void main()
{
   int n,s=0,i;
   printf("Enter the number:\n");
   scanf("%d",&n);
   for(i=1;i<=n;i++)
      s+=i*i;
   printf("Sum of squares of the first %d natural numbers is: %d\n",n,s);
}
```

O/P:

Enter the number:

5

Sum of squares of the first 5 natural numbers is: 55

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

```
#include <stdio.h>
void main()
{
   int x,y,i;
   long long r=1;
   printf("Enter the base x:\n");
   scanf("%d",&x);
   printf("Enter the exponent y:\n");
   scanf("%d",&y);
   for(i=1;i<=y;i++)
      r*=x;
   printf("%d raised to the power %d is: %lld\n",x,y,r);
}
```

O/P:

```
Enter the base x:
2
Enter the exponent y:
10
2 raised to the power 10 is: 1024
```

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

```
#include <stdio.h>
void main()
```

```
{
   int i;
   for(i=100;i>=1;i--)
      printf("%d ", i);
   printf("\n");
}
```

O/P:

100 99 98 97 96 95 94 93 92 91 90 89 88 87 86 85 84 83 82 81 80 79 78 77 76 75 74 73 72 71 70 69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

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

```
#include <stdio.h>
void main()
{
   int n,c=0,i;
   printf("Enter the number:\n");
   scanf("%d",&n);
   for(i=1;i<=n;i++)
   {
      if(n%i==0)
         c++;
   }
   printf("Divisors of %d is: %d\n",n,c);
}
```

O/P:

Enter the number:

5

Divisors of 5 is: 2

Do-While Loop

1. Write a menu-driven calculator using a do-while loop. Continue asking for user input until they choose to exit.

```
#include<stdio.h>
void main()
{
   int n1,n2,n3;
   char op;
   printf("Enter the numbers n1 and n2:\n");
   do
   {
      scanf("%d %d",&n1,&n2);
      printf("Enter the op\n+ add\n- sub\n* mul\n/ div\n");
      scanf(" %c",&op);
      switch(op)
      {
         case '+':n3=n1+n2;
                  printf("n3=%d\n",n3);
                  break;
```

```
            case '-':n3=n1-n2;
                    printf("n3=%d\n",n3);
                    break;
            case '*':n3=n1*n2;
                    printf("n3=%d\n",n3);
                    break;
            case '/':n3=n1/n2;
                    printf("n3=%d\n",n3);
                    break;
            default:printf("Invalid option\n");
                    break;
          }
      } while (op<=5);
}
```

O/P:

```
Enter the numbers n1 and n2:
4 2
Enter the op
+ add
- sub
* mul
/ div
-
n3=2
```

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

```
#include <stdio.h>
void main()
{
   int n;
   printf("Enter the number:\n");
   do
   {
      scanf("%d",&n);
      if(n!=0)
         printf("Number=%d\n",n);
   } while(n!=0);
   printf("Encountered zero (0)\n");
}
```

O/P:

```
Enter the number:
5
Number=5
48
Number=48
457
Number=457
012
Number=12
0
Encountered zero (0)
```

3. 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>
void main()
{
   char p[20];
   char cp[]="Pass123!";
   int c,i;
   printf("Enter the password:\n");
   do
   {
      scanf("%s",p);
      if(c=1)
      {
         for(i=0;cp[i]!='\0' || p[i]!='\0';i++)
         {
            if(p[i]!=cp[i])
         {
               c=0;
               break;
            }
         }
      }
   } while(!c);
   printf("Valid password\n");
}
```

O/P:

Enter the password:

gdhftErt45*

Dsweatgy786!

Pass123!

Valid password

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

```
#include <stdio.h>
void main()
{
   int n,s=0;
   printf("Enter the number:\n");
   do
   {
      scanf("%d",&n);
      if(n>=0)
         s+=n;
   } while(n>=0);
   printf("Sum of the numbers: %d\n",s);
}
```

O/P:

Enter the number:

4

4

6

8

-9

Sum of the numbers: 22

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

```
#include <stdio.h>
void main()
{
   int n,c,i;
   do
   {
      printf("Enter the number:\n");
      scanf("%d",&n);
      for(i=1;i<=10;i++)
         printf("%d x %d = %d\n",n,i,n*i);
      printf("Enter 1 to continue or 0 to stop:\n");
      scanf("%d",&c);
   } while(c==1);
   printf("Program is stopped\n");
}
```

O/P:

Enter the number:

5

5 x 1 = 5

5 x 2 = 10

5 x 3 = 15

5 x 4 = 20

5 x 5 = 25

5 x 6 = 30

5 x 7 = 35

5 x 8 = 40

5 x 9 = 45

5 x 10 = 50

Enter 1 to continue or 0 to stop:

1

Enter the number:

4

4 x 1 = 4

4 x 2 = 8

4 x 3 = 12

4 x 4 = 16

4 x 5 = 20

4 x 6 = 24

4 x 7 = 28

4 x 8 = 32

4 x 9 = 36

4 x 10 = 40

Enter 1 to continue or 0 to stop:

0

Program is stopped

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

```
#include <stdio.h>
void main()
{
   int gn=18,g;
   do
   {
      printf("Enter the number to be guessed:\n");
      scanf("%d",&g);
      if(g>gn)
         printf("Entered a greater number than the guess number\n");
      else if(g<gn)
         printf("Entered a lesser number than guess number\n");
      else
         printf("Entered the correct guessed number: %d\n",gn);
   } while (g!=gn);
}
```

O/P:

```
Enter the number to be guessed:
12
Entered a lesser number than guess number
Enter the number to be guessed:
25
Entered a greater number than the guess number
Enter the number to be guessed:
```

18

Entered the correct guessed number: 18

7. 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>
void main()
{
   int n;
   do
   {
      printf("Enter a number between 1 and 10:\n");
      scanf("%d",&n);
      if(n<1 || n>10)
         printf("Number is out of range\n");
   } while(n<1 || n>10);
   printf("Entered number is within the range\n");
}
```

O/P:

Enter a number between 1 and 10:

15

Number is out of range

Enter a number between 1 and 10:

25

Number is out of range

Enter a number between 1 and 10:

8

Entered number is within the range

8. 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>
void main()
{
   int n,s=0,c=0,a;
   do
   {
      printf("Enter the number:\n");
      scanf("%d",&n);
      if(n!=0)
      {
         s+=n;
         c++;
      }
   } while(n!=0);
   if(c>0)
   {
      a=(s)/c;
      printf("The average is: %d\n",a);
   }
   else
      printf("Enter the series of numbers\n");
}
```

O/P:

Enter the number:

1

Enter the number:

5

Enter the number:

4

Enter the number:

2

Enter the number:

0

The average is: 3

Enter the number:

0

Enter the series of numbers

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

```
#include <stdio.h>
void main()
{
   char ch='a';
   do
   {
      printf("%c ",ch);
```

```
        ch++;
    } while (ch<='z');
    printf("\n");
}
```

O/P:

a b c d e f g h i j k l m n o p q r s t u v w x y z

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

```
#include <stdio.h>
void main()
{
    int n,c=0;
    printf("Enter the number:\n");
    scanf("%d",&n);
    if(n<0)
        n=-n;
    do
    {
        c++;
        n/=10;
    } while(n!=0);
    printf("The number of digits is %d\n",c);
}
```

O/P:

Enter the number:

154786

The number of digits is 6

Enter the number:

-5476

The number of digits is 4

Patterns

Problem statements with respect to Pattern printing using for as well as while loop

1. Pascal's Triangle

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

```
#include <stdio.h>
void main()
{
   int r,i,j,k,f;
   printf("Enter the number of rows:\n");
   scanf("%d",&r);
```

```
        for(i=0;i<r;i++)
        {
            for(k=0;k<r-i-1;k++)
                printf(" ");
            f=1;
            for(j=0;j<=i;j++)
            {
                printf("%d ",f);
                f=f*(i-j)/(j+1);
            }
            printf("\n");
        }
    }
```

O/P:

Enter the number of rows:

5

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

2. Binary Pattern

```
1
01
101
0101
10101
```

```
#include <stdio.h>
void main()
{
   int r,i,j,k;
   printf("Enter the number of rows:\n");
   scanf("%d",&r);
   for(i=1;i<=r;i++)
   {
      for(j=1;j<=i;j++)
      {
         k=i+j;
         if(k%2==0)
            printf("1");
         else
            printf("0");
      }
      printf("\n");
   }
}
```

O/P:

```
Enter the number of rows:
5
```

1

01

101

0101

10101

3. Floyd’s Triangle (Numbers)

1

2 3

4 5 6

7 8 9 10

11 12 13 14 15

```
#include <stdio.h>
void main()
{
   int r,i,j,n=1;
   printf("Enter the number of rows:\n");
   scanf("%d",&r);
   for(i=1;i<=r;i++)
   {
      for(j=1;j<=i;j++)
      {
         printf("%d ",n);
         n++;
      }
      printf("\n");
```

```
    }
}
```

O/P:

```
Enter the number of rows:
5
1
2 3
4 5 6
7 8 9 10
11 12 13 14 15
```

4. Inverted Right-Angled Triangle (Numbers)

```
12345
1234
123
12
1
```

```
#include <stdio.h>
void main()
{
   int r,i,j;
   printf("Enter the number of rows:\n");
   scanf("%d",&r);
   for(i=r;i>=1;i--)
   {
      for(j=1;j<=i;j++)
```

```
            printf("%d",j);
        printf("\n");
    }
}
```

O/P:

Enter the number of rows:

5

12345

1234

123

12

1

5. Diamond (Stars)

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

```
#include <stdio.h>
void main()
{
   int r,i,j,k;
   printf("Enter the number of rows:\n");
   scanf("%d",&r);
   for(i=1;i<=r;i++)
   {
      for(k=1;k<=r-i;k++)
         printf(" ");
      for(j=1;j<=(2*i-1);j++)
         printf("*");
      printf("\n");
   }
   for(i=r-1;i>=1;i--)
   {
       for(k=0;k<r-i;k++)
         printf(" ");
      for(j=1;j<=(2*i-1);j++)
         printf("*");
      printf("\n");
   }
}
```

O/P:

```
Enter the number of rows:
5
    *
   ***
  *****
 *******
*********
 *******
  *****
   ***
    *
```

6. Inverted Pyramid (Stars)

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

```
#include<stdio.h>
void main()
{
   int r,i,j,k;
   printf("Enter the number of rows:\n");
   scanf("%d",&r);
   for(i=r;i>=1;i--)
   {
      for(k=0;k<r-i;k++)
```

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

O/P:

```
Enter the number of rows:
5
*********
 *******
  *****
   ***
    *
```

Storage classes

1. WAP to print how many times a particular function is called from the main function.

```
#include <stdio.h>
void func1(void);
void main()
{
   func1();
   func1();
   func1();
   func1();
}
```

```
void func1()
{
   static int count=0;
   count+=1;
   printf("The function is called %d times\n",count);
}
```

O/P:

```
The function is called 1 times

The function is called 2 times

The function is called 3 times

The function is called 4 times
```