Leap Year:
```c
#include<stdio.h>
void main(){
int year;
printf("Enter a year:");
scanf("%d",&year);
if((year%400==0) || ((year%4==0) && (year%100!=0)))
  printf("Leap Year");
else
  printf("Not a leap year");
}
```

Largest of 3 numbers:
```c
#include<stdio.h>
void main(){
int a,b,c;
printf("Enter three numbers:");
scanf("%d%d%d",&a,&b,&c);
if(a>b && a>c)
 printf("largest=%d", a);
else if (b>a && b>c)
 printf("largest=%d", b);
else
 printf("largest=%d", c);
}
```

Roots of Quadratic Equation
```c
#include<stdio.h>
#include<math.h>
void main(){
float a,b,c,d,r1,r2,rp,ip;
printf("Enter value of a,b,c:");
scanf("%f%f%f",&a,&b,&c);
d = sqrt(b*b - 4*a*c);
if(d>=0)
{
  r1 = (-b+sqrt(d))/2*a;
  r2 = (-b-sqrt(d))/2*a;
  printf("Roots are:%0.2f and %0.2f",r1,r2);
}
else
{
  d = -d;
  rp = -b/2*a;
  ip = d/2*a;
  printf("Roots are:%0.2f+i%0.2f and %0.2f-i%0.2f",rp,ip,rp,ip);
}
}
```

Basic Calculator:
```c
#include<stdio.h>
void main(){
int a,b,choice;
float c;
char ans='n';
do
{
  printf("Enter two numbers:");
  scanf("%d%d",&a,&b);
  printf("\n1.ADDITION\n2.SUBTRACTION\n3.MULTIPLICATION\n4.DIVISION");
  printf("\nEnter your choice : ");
  scanf("%d",&choice);
  switch(choice)
```

```c
   {
     case 1:c=a+b;
                 printf("Result: %d",c);
                 break;
     case 2:c=a-b;
                 printf("Result: %d",c);
                 break;
     case 3:c=a*b;
                 printf("Result: %d",c);
                 break;
     case 4:c=a/b;
                 printf("Result: %f",d);
                 break;
     default:printf("Wrong Choice");
   }
   printf("\nDo you want to continue???");
   ans = getch();
}while(ans=='y' || ans=='Y');
}
```

Sum of first 'n' numbers:
```c
#include<stdio.h>
void main(){
int n,i,sum=0;
printf("Enter the value of n:");
scanf("%d",&n);
for(i=1;i<=n;i++)
  sum=sum+i;
printf("Sum of n numbers: %d",sum);
}
```

Factorial of a number:
```c
#include<stdio.h>
void main(){
int i,n,fact=1;
printf("Enter the no");
scanf("%d",&n);
for(i=1;i<=n;i++)
  fact=fact*i;
printf("Factorial is: %d",fact);
}
```

Fibonacci Series:
```c
#include<stdio.h>
void main()
{
int i,no,a=0,b=1,c;
printf("Enter the value of n:");
scanf("%d",&no);
printf("%d\n%d\n",a,b);
for(i=1;i<=n-2;i++)
{
 c=a+b;
 printf("%d",c);
 a=b;
 b=c;
}
}
```

Factors of a number:
```c
#include<stdio.h>
void main(){
int n,i;
```

```c
printf("Enter a number:");
scanf("%d",&n);
printf("Factors are:\n");
i=2;
while(i<=n-1)
{
  if(n%i==0)
    printf("%d\n",i);
  i++;
}
}
```

Prime Number:
```c
#include<stdio.h>
void main(){
int n,i=2,prime=1;
printf("Enter the No:");
scanf("%d",&n);
while(i<=n/2)
{
  if(n%i==0)
  {
    prime=0;
    break;
  }
  i++;
}
if(prime==1)
  printf("%d is a Prime no",n);
else
  printf("%d is not a Prime no",n);
}
```

Prime Numbers from 1 to 100:
```c
#include<stdio.h>
void main(){
int limit=100,i,n,prime;
for(n=2;n<=limit;n++)
{
  i=2,prime=1;
  while(i<=n/2)
  {
    if(n%i==0)
    {
      prime=0;
      break;
    }
    i++;
  }
  if(prime==1)
  {
    printf("%d\n",n);
  }
}
}
```

Sum and product of digits of a number:
```c
#include<stdio.h>
void main(){
int n,dig,sum=0,p=1;
printf("Enter any number:");
scanf("%d",&n);
do
```

```c
{
 dig=n%10;
 sum=sum+dig;
 p=p*dig;
 n=n/10;
}while(n!=0);
 printf("Sum is:%d",sum);
 printf("Product is:%d",p);
}
```

Armstrong Number:
```c
#include<stdio.h>
void main(){
int n,cp,dig,sum=0;
printf("Enter any number:");
scanf("%d",&n);
cp=n;
do
{
 dig=n%10;
 sum=sum+dig*dig*dig;
 n=n/10;
}while(n!=0);
if(sum==cp)
 printf("Armstrong Number");
else
 printf("Not an Armstrong Number");
}
```

Armstrong Number from 1 to 1000:
```c
#include<stdio.h>
void main(){
int n,temp,dig,sum,limit=1000;
for(n=1; n<=limit; n++)
{
 temp=n;
 sum=0;
 while(n>0)
 {
  dig=n%10;
  sum=sum+(dig*dig*dig);
  n=n/10;
 }
 if(temp==sum)
  printf("%d\n",no);
}
}
```

Reverse of a number:
```c
#include<stdio.h>
void main(){
int n,digit,rev=0;
printf("Enter a number");
scanf("%d",&n);
while(n!=0)
{
 digit=n%10;
 rev=rev*10+digit;
 n=n/10;
}
printf("Reverse is: %d",rev);
}
```

Palindrome Number:

```c
#include<stdio.h>
void main(){
int n,digit,rev=0,og;
printf("Enter a number:");
scanf("%d",&n);
og = n;
while(n >= 1)
{
  digit = n % 10;
  rev = rev * 10 + digit;
  n = n / 10;
}
if(og==rev)
  printf("Palindrome Number");
else
  printf("Not a Palindrome Number");
}
```

LCM and GCD of numbers:

```c
#include<stdio.h>
void main(){
int n1,n2,lcm,gcd;
printf("Enter two numbers:");
scanf("%d%d",&n1,&n2);
if(n1>n2)
{
  lcm=n1;
  gcd=n2;
}
else
{
  lcm=n2;
  gcd=n1;
}
while(lcm%n1!=0 || lcm%n2!=0)
  lcm++;
while(n1%gcd!=0 || n2%gcd!=0)
  gcd--;
printf("LCM=%d\nGCD=%d",lcm,gcd);
}
```

Binary equivalent of Decimal number:

```c
#include<stdio.h>
void main(){
long int bn = 0;
int digit, n, temp = 1;
printf("Enter a Number:");
scanf("%d",&n);
while(n!=0){
  digit = n%2;
  bn = bn + digit * temp;
  temp = temp * 10;
  n = n/2;
}
printf("Binary Number is: %ld",bn);
}
```

Even/Odd Nunber:
```c
#include<stdio.h>
void main(){
int num;
printf("Enter the number:");
scanf("%d",&num);
if(num%2==0)
  printf("\n%d is even number",num);
else
  printf("\n%d is odd number",num);
}
```

Largest of 3 Numbers:
```c
#include<stdio.h>
void main(){
int a,b,c;
printf("Enter three numbers:");
scanf("%d%d%d",&a,&b,&c);
if(a>b && a>c)
 printf("largest=%d", a);
else if (b>a && b>c)
 printf("largest=%d", b);
else
 printf("largest=%d", c);
}
```

Largest of 3 Numbers using Nested if-else:
```c
#include<stdio.h>
void main(){
int a,b,c;
printf("Enter three integers:");
scanf("%d%d%d",&a,&b,&c);
if(a>b){
  if(a>c)
    printf("a is the biggest");
  else
    printf("c is biggest");
}
else {
  if(b>c)
    printf("b is biggest");
  else
    printf("c is biggest");
}
}
```

To find character is an alphabet:
```c
#include<stdio.h>
void main(){
char c;
printf("Enter a character:");
scanf("%c",&c);
if((c>='a' && c<='z') || (c>='A' &&
c<='Z'))
  printf("%c is an alphabet",c);
else
  printf("%c is not an alphabet",c);
}
```

Month Name:
```c
#include<stdio.h>
void main(){
int month;
printf("Enter a month number:");
scanf("%d",&month);
switch(month){
  case 1:printf("January"); break;
  case 2:printf("February"); break;
  case 3:printf("March"); break;
  case 4:printf("April"); break;
  case 5:printf("May"); break;
  case 6:printf("June"); break;
  case 7:printf("July"); break;
  case 8:printf("August"); break;
  case 9:printf("September"); break;
  case 10:printf("October"); break;
  case 11:printf("November"); break;
  case 12:printf("December"); break;
  default: printf("Invalid number");
}
}
```

Sum of n numbers:
```c
#include<stdio.h>
void main(){
int n,i,sum=0;
printf("Enter the value of n:");
scanf("%d",&n);
for(i=1;i<=n;i++)
  sum=sum+i;
printf("Sum of n numbers: %d",sum);
}
```

To count no. of digits:
```c
#include<stdio.h>
void main(){
int n,count=0;
printf("Enter number:");
scanf("%d",&n);
while(n!=0){
  count++;
  n=n/10;
}
}
```

Factors of a number:
```c
#include<stdio.h>
void main(){
int n,i;
printf("Enter a number:");
scanf("%d",&n);
printf("Factors are:\n");
i=2;
while(i<=n-1){
  if(n%i==0)
    printf("%d\n",i);
  i++;
}
}
```

Multiplication Table:
```c
#include <stdio.h>
void main(){
int n,i,j;
printf("Enter an integer:");
scanf("%d",&n);
for(i=1;i<=n;i++){
  for(j=1;j<=10;j++)
    printf("%d\t", i*j);
  printf("\n");
}
}
```

Pattern Programs:

1.
```
****
***
**
*
```
```c
#include<stdio.h>
void main(){
inti,j,n=4;
for(i=0;i<n;i++){
for(j=0;j<n;j++){
printf("*");
}
n--;
printf("\n");
}
}
```

2.
```
   *
  * *
 * * *
  * *
   *
```
```c
#include<stdio.h>
void main(){
int i,j;
for(i=1;i<=3;i++){
for(j=1;j<=3-i;j++){
printf(" ");
}
for(j=1;j<=i;j++){
printf("* ");
}
printf("\n");
}
for(i=3-1;i>=1;i--) {//for downward pyramid
for(j=1;j<=3-i;j++){
printf(" ");
}
for(j=i;j>=1;j--){
printf("* ");
}
printf("\n");
}
}
```

3.
```
   1
  121
 12321
1234321
```
```c
#include<stdio.h>
void main(){
int i,j;
for(i=1;i<=4;i++){
for(j=1;j<=4-i;j++){
printf(" ");
}
for(j=1;j<=i;j++){
printf("%d",j);
}
for(j=i-1;j>=1;j--){
```

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

4.
```
*
**
***
****
```
```c
#include<stdio.h>
void main(){
int no,i,j;
printf("Enter no of rows\n");
scanf("%d",&no);
for(i=1;i<=no;i++){
for(j=1;j<=i;j++){
printf("*");
}
printf("\n");}}
```

5.
```
1
12
123
1234
```
```c
#include<stdio.h>
void main(){
int no,i,j;
printf("Enter no of rows\n");
scanf("%d",&no);
for(i=1;i<=no;i++){
for(j=1;j<=i;j++){
printf("%d",j);
}
printf("\n");
}
}
```

6.(Pascal triangle)

```
   1
  1 1
 1 2 1
1 3 3 1
```
```c
#include<stdio.h>
int facto(int no){
int i,fact=1;
for(i=1;i<=no;i++){
fact=fact*i;
}
return fact;
}
void main(){
int no,fa,i,j;
printf("Enter no\n");
scanf("%d",&no);
for(i=0;i<no;i++){
for(j=0;j<no-i;j++){
printf(" ");
}
for(j=0;j<=i;j++){
```

```c
fa=facto(i)/(facto(j)*facto(i-j));
printf("%d ",fa);
}
printf("\n");
}
}
```

7.
```
   A
  ABA
 ABCBA
ABCDCBA
```
```c
#include<stdio.h>
void main(){
int i,j,n;
printf("Enter the number of lines:");
scanf("%d",&n);
for(i=1;i<=n;i++){
for(j=1;j<=n-i;j++){
printf(" ");
}
for(j=1;j<=i;j++){
printf("%c",(char)(j+64));
}
for(j=i-1;j>=1;j--){
printf("%c",(char)(j+64));
}
printf("\n");
}
}
```

8.
```
   *
  * *
 * * *
* * * *
 * * *
  * *
   *
```
```c
#include<stdio.h>
void main()
{
int i,j,n;
printf("Enter the number of * in the middle line:");
scanf("%d",&n);
for(i=1;i<=n;i++){
for(j=1;j<=n-i;j++){
printf(" ");
}
for(j=1;j<=i;j++){
printf("*");
}
printf("\n");
}
for(i=n-1;i>=1;i--) {//for downward pattern
for(j=1;j<=n-i;j++){
printf(" ");
}
for(j=1;j<=i;j++){
printf("*");
}
printf("\n");
}
```

}

9.
A
B C
D E F
G H I J
K L M N
```c
#include<stdio.h>
void main(){
int i,j,n,k;
printf("Enter the number of lines:");
scanf("%d",&n);
for(i=1,k=1;i<=n;i++){
for(j=1;j<=i;j++){
printf("%c ",64+k);
k++;
}
printf("\n");
}
}
```

10.
A
A B
A B C
A B C D
A B C D E
```c
#include<stdio.h>
void main(){
int i,j,n=5,k;
for(i=1;i<=n;i++){
for(j=1,k=1;j<=i;j++){
printf("%c ",64+k);
k++;
}
printf("\n");
}
}
```

11.
1
1 2
1 2 3
1 2 3 4
Solution:
```c
#include <stdio.h>
void main(){
int i,j,n;
printf("Enter line no:");
scanf("%d",&n);
for ( i = 1; i <= n; i++){
for ( j = 1; j <= i; j++){
printf("%d",j);
}
printf("\n");
}
}
```
11.
```
    1
   1 2 A
  1 2 3 A B
 1 2 3 4 A B C
```

```c
#include <stdio.h>
void main(){
int i,j,k,l,n, alpha=65;
printf("Enter line no:");
scanf("%d",&n);
for(i=1;i<=n;i++){
for(j=n;j>i;j--){
printf(" ");
}
for(k=1;k<=i;k++) {
printf("%d",k);
}
for(alpha=65,l=1;l<i;l++,alpha++) {
printf("%c",(char)alpha);
}
printf("\n");
}
}
```

WAP to calculate the value of a series: $1 + 2^2 + 3^3 \ldots n^n$.
```
#include<stdio.h>
#include<math.h>
void main(){
int n, i, sum = 0;
printf("Enter any integer:");
scanf("%d",&n);
for(i=1;i<=n;i++)
  sum = sum + pow (i,i);
printf("\nSum = %d",sum);
}
```

WAP to calculate the value of a series: ½ + ¾ + ⅝ … n terms.
```
#include<stdio.h>
void main(){
int n,i,j;
float sum = 0;
printf("Enter any integer:");
scanf("%d",&n);
for(i=1,j=1;i<=n;i++,j=j+2)
  sum = sum + (float)j/(j+1);
printf("\nSum=%f",sum);
}
```

WAP to calculate the value of a series: ½ - ¾ + ⅝ - ⅞ … n terms.
```
#include<stdio.h>
void main(){
int n,i,j,s=1;
float sum = 0;
printf("Enter any integer:");
scanf("%d",&n);
for(i=1,j=1;i<=n;i++,j=j+2)
{
  sum = sum + s * (float)j/(j+1);
  s=-s;
}
printf("\nSum=%f",sum);
}
```

WAP to calculate the value of a series: 1/1! + 2/2! + 3/3! … n/n!.
```
#include <stdio.h>
void main(){
float n,sum=0, f=1, i;
printf("Enter the value:");
scanf("%f",&n);
for(i=1;i<=n;i++)
{
  f = f * i;
  sum = sum + (i/f);
}
printf("Sum of the series= %f",sum);
}
```

WAP to calculate value of a series: x - x/2! + x/3! - x/4!…x/n!
```
#include<stdio.h>
void main(){
float n,sum=0, f=1, i, s=1,x;
printf("Enter value of n and x:");
scanf("%f%f", &n,&x);
for(i = 1; i <= n; i++) {
```

```c
  f = f * i;
  sum = sum + s*(x/f);
  s=-s;
}
printf("Sum of the series= %f",sum);
}
```

WAP to calculate value of a series: sin x = x - $x^3/3!$ + $x^5/5!$ ... $x^n/n!$

```c
#include<stdio.h>
#include<math.h>
void main(){
int i,n,fact=1,sign=-1;
float x,num,sum,term;
printf("Enter the angle in degrees and value of n");
scanf("%f%d",&x,&n);
x=x*3.14/180;
sum=x;
for(i=3;i<=n;i=i+2)
{
  fact=fact*i*(i-1);
  term=pow(x,i)/fact;
  sum=sum+sign*term;
  sign=-sign;
}
printf("Value of series= %f",sum);
}
```