Day_2 C-Programming

Conditional Program Execution

(RECAP OF PREVIOUS DAY)

if, else-if, nested if-else, switch statements, use of break, and default with switch, Concept of loops, for, while and do while, multiple loop variables, use of break and continue statements, nested loop.

Conditional Statements: In C Programming we want the program to be executed sequentially. We want a set of instruction to be executed at one time and an entirely set of instruction to be executed in another situation. In this type of situation will have to use the decision control structure.

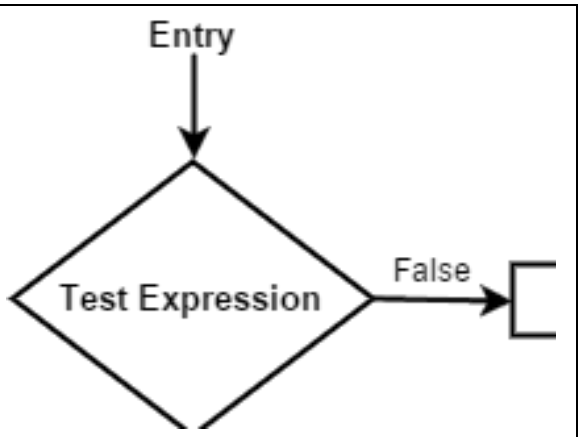
In C Language decision making capabilities are supported by following statements.

- **if statement**
- **switch statement**
- **Conditional Operator**

if statements: The if statement is a decision making statements. It is two-way decision statement and used in combination with an expression.

Syntax:

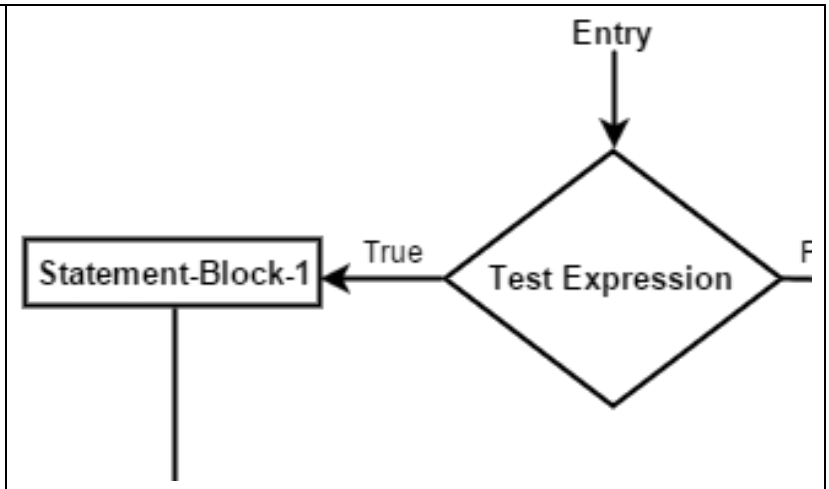
```
if(test expression)
 {
   Statement-block;
 }
Statement-X;
```



if else Statement: In this, the body of if is executed if the result of expression is true, otherwise the else block is executed and then the control is transferred to the next statement.

Syntax:

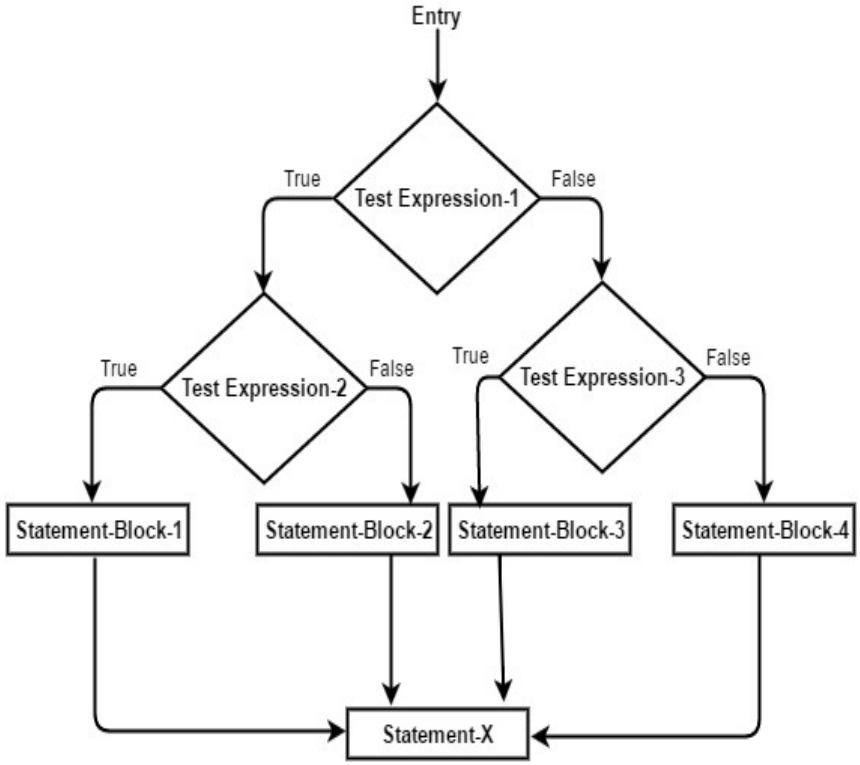
```
if(test expression)
{
statement block-1;
}
else
{
statement block-2;
}
statement-x;
```



Nested if else Statement: When an if statement is written inside another if statement, it is called a nested if statement.

Syntax:

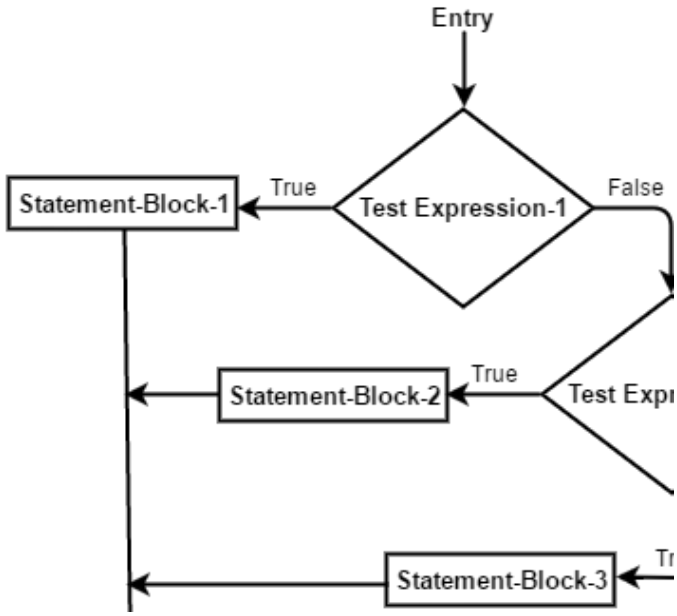
```
if(test expression-1)
{
    if(test expression-2)
     {
       statement block-1;
      }
     else
     {
       statement block-2;
      }
}
else
{
    if(test expression-3)
     {
      statement block-3;
      }
    else
     {
      statement block-4;
     }
}
Statement-x;
```



else if Ladder: It is a multiway branching statement. It start by checking the first logical expression. If the expression is true, then the body of first if is executed. Otherwise the next expression is evaluated and so on. When an expression is found to be true, the statements associated with it are executed and then the control is transferred.

Syntax:

```
if(test expression-1)
{
Statement block-1
}
else if(test expression-2)
{
Statement block-2
}
else if(test expression-3)
{
Statement block-3
}
else
{
statement block-4
}
Statement-x;
```



- ✓ **Write a program to check whether a number is even or odd.**

```
#include<stdio.h>
#include<conio.h>
void main()
{
int n;
printf("Enter a Number");
scanf("%d",&n);
if(n%2==0)
printf("Number is Even");
else
printf("Number is odd");
getch();
}
```

- ✓ **Write a program to check whether a year is a leap year or not.**

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

- ✓ **Write a program to convert an uppercase letter into lowercase and vice-versa.**

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

```
{
char ch;
printf("Eneter a character");
scanf("%c",&ch);
if(ch>='A' && ch<='Z' )
{
ch=ch+32;
printf("%c",ch);
}
else if(ch>='a' && ch<='z')
{
ch=ch-32;
printf("%c",ch);
}
else
printf("Invalid Character");
getch(); }
```

- ✓ **Write a program to find the largest number among three numbers.**

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a,b,c;
printf("Enter three Numbers");
scanf("%d%d%d",&a,&b,&c);
if(a>b && a>c)
printf("%d is largest",a);
else if(b>a && b>c)
printf("%d is largest",b);
else
printf("%d is largest",c);
getch();
}
```

- ✓ **Write a program to check whether a number is positive, negative or zero.**

```
#include<stdio.h>
#include<conio.h>
void main()
{
int n;
printf("Enter Number");
scanf("%d",&n);
if(n>0)
printf("Number is Positive");
else if(n<0)
printf("Number is Positive");
else
printf("Number is Zero");
getch();
}
```

- ✓ **Write a program to find the largest number among three numbers**

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

```
#include<conio.h>
void main()
{
int a, b, c, x;
printf("Enter three numbers");
scanf("%d%d%d",&a,&b,&c);
x=a>b?a>c:a:c:b>c?b:c;
printf("Largest number=%d",x);
getch();
}
```

Switch Statement: The switch statement is a multiway decision statement. The switch statement test the value of a given variable or expression against a list of case values and when a match is found a block of statement associated with that case is executed.

Syntax:

```
switch(expression)
{
caes value1: block-1;
             break;
caes value2: block-2;
             break;
caes value3: block-3;
             break;
default:     block-1;
             break;
}
```

Advantages of Switch

(i). Easier to debug.
(ii). Easier to read, understand, and maintain.
(iii). Faster execution.
(iv). More efficient (destination can be computed by looking up in table).

Limitations (Disadvantages) of switch statement

(i). It doesn't work with floats, strings, etc.
(ii). Relational and logical operators are not allowed in switch case.
(iii). It doesn't work with variable conditions i.e. case values cannot be variable.

- ✓ **Write a program to simulate calculator using switch statement.**

```
#include<stdio.h>
#include<conio.h>
void main()
{
float a,b,c;
char op;
printf("Enter two numbers");
scanf("%f%f",&a,&b);
fflush(stdin);
printf("Enter Operator");
scanf("%c",&op);
```

```
switch(op)
{
case '+': c=a+b;
        printf("Addition=%f",c);
        break;
case '-': c=a-b;
        printf("Subtraction=%f",c);
        break;
case '*': c=a*b;
        printf("Multiplication=%f",c);
        break;
case '/': c=a/b;
        printf("Division=%f",c);
        break;
default: printf("Invalid Operator");
        break;
}
getch();
}
```

- ✓ **Write a menu driven program to calculate the area of different geometrical figures such as rectangle, square, circle and triangle.**

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
void main()
{
float a,b,c,s,area;
int n;
printf("Enter:\n1:For rectangle\n2:For square\n3:For circle\n4:For triangle\n");
scanf("%d",&n);
switch(n)
{
case 1: printf("Enter length and breadth of rectangle");
        scanf("%f%f",&a,&b);
        area=a*b;
        printf("Area of Rectanle:%f",area);
        break;
case 2: printf("Enter the side of square");
        scanf("%f",&a);
        area=a*a;
        printf("Area of Square:%f",area);
        break;
case 3: printf("Enter the radius of circle");
        scanf("%f",&a);
        area= 3.14*a*a;
        printf("Area of Circle:%f",area);
        break;
case 4: printf("Enter the three sides of triangle ");
        scanf("%f%f%f",&a,&b,&c);
        s=(a+b+c)/2;
        area=sqrt(s*(s-a)*(s-b)*(s-c));
```

```
        printf("Area of Triangle:%f",area);
        break;
default: printf("Invalide Choice");
        break;
}
getch();
}
```

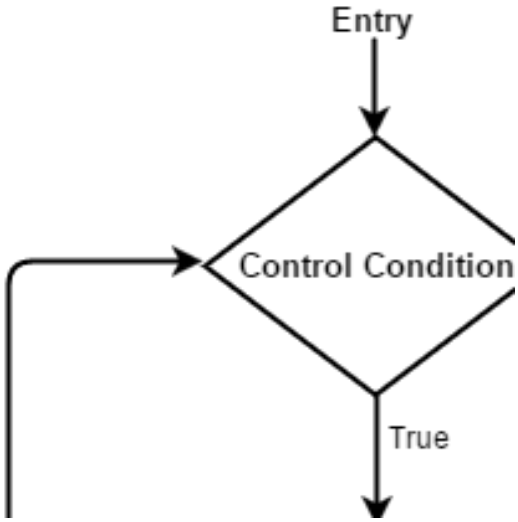
Difference between switch and if statement

switch	if
1) In switch statement the condition is tested only once and jumps to required block.	**1)** In multiple if statements the conditions are to be checked as many times the if statements are written.
2) A switch statement is generally best to use when you have more than two conditional expressions based on a single variable of numeric & character type.	**2)** A if else statement can take any kind of value in conditional expression.
3) Logical operators are not allowed in case.	**3)** All operators are allowed in if else statement.

Looping: In looping, a sequence of statements are executed until some condition for termination of the loop are satisfied.
A program loop consist of two parts- one known as control statement and other known as body of loop. Depending on position of control statements there are ***two*** types of loop.

(1) Entry controlled loop
(2) Exit controlled loop

(1) Entry controlled loop: In this type of loop the control conditions are tested before the body of loop is executed. Example: ***for*** and ***while***.



(2) Exit controlled loop: In this type of loop the control conditions are tested at the end of the body of loop. Example: ***do while***.

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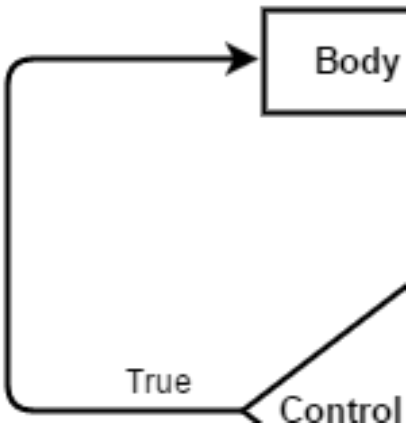


for loop: It is an entry controlled loop. This loop is used when the number of iterations are known in advance.

Syntax: *for(initialization; condition; increment/decrement)*

{
Body of loop;
}

while loop: It is an entry controlled loop. This loop is used when the number of iterations are not known in advance.

Syntax: *while(condition)*

{
Body of loop;
}

do while loop: It is an exit controlled loop. In this loop the body of loop is always executed at least one time even if the condition is false for the first time .

Syntax: *do*

{
Body of loop;
}
while(condition);

Differentiate among for, while and do while loop

for loop	while loop	do-while loop
(i). It is an entry controlled loop.	**(i).** It is an entry controlled loop.	**(i).** It is an exit controlled loop.
(ii). Its body may not be executed even once if the condition is false.	**(ii).** Its body may not be executed even once if the condition is false.	**(ii).** Its body is always executed at least once even if the condition is false initially.
(iii). It is used when the number of iterations is known in advance.	**(iii).** It is used when the number of iterations is not known in advance.	**(iii).** It is used when the number of iterations is not known in advance.

- ✓ **Write a program to find the sum of digits of an integer number.**

```
#include<stdio.h>
#include<conio.h>
void main()
{
int n,d,s=0;
printf("Eneter the number");
scanf("%d",&n);
while(n>0)
{
d=n%10;
s=s+d;
n=n/10;
}
printf("The Sum of digits:=%d",s);
getch();
}
```

- ✓ **Write a program to find the sum of digit square of an integer number.**

```
#include<stdio.h>
#include<conio.h>
void main()
{
int n,d,s=0;
printf("Eneter the number");
scanf("%d",&n);
while(n>0)
{
d=n%10;
s=s+d*d;
n=n/10;
}
printf("The Sum of Digits Square:=%d",s);
getch();
}
```

- ✓ **Write a program to find the reverse of an integer number.**

```
#include<stdio.h>
#include<conio.h>
void main()
{
int n,d,s=0;
printf("Eneter the number");
scanf("%d",&n);
while(n>0)
{
d=n%10;
s=s*10+d;
n=n/10;
}
printf("The Reverse of Number:=%d",s);
```

```
getch();
}
```

- ✓ **Write a program to check whether an integer number is palindrome or not.**

```
#include<stdio.h>
#include<conio.h>
void main()
{
int n,d,s=0,t;
printf("Eneter the number");
scanf("%d",&n);
t=n;
while(n>0)
{
d=n%10;
s=s*10+d;
n=n/10;
}
if(s==t)
printf("Number is Palindrome Number");
else
printf("Number is not Palindrome Number");
getch();
}
```

- ✓ **Write a program to check whether an integer number is Armstrong or not.**

```
#include<stdio.h>
#include<conio.h>
void main()
{
int n,d,s=0,t;
printf("Eneter the number");
scanf("%d",&n);
t=n;
while(n>0)
{
d=n%10;
s=s+d*d*d;
n=n/10;
}
if(s==t)
printf("Number is Armstrong Number");
else
printf("Number is not Armstrong Number");
getch();
}
```

- ✓ **Write a program to check whether an integer number is Prime number or not.**

```
#include<stdio.h>
#include<conio.h>
void main()
{
int n,i,c=0;
printf("Eneter the number");
```

```
scanf("%d",&n);
for(i=1;i<=n;i++)
{
if(n%i==0)
c++;
}
if(c==2)
printf("Number is Prime Number");
else
printf("Number is not Prime Numbe");
getch();
}
```

- ✓ **Write a program to print all Prime number between 1 and 100.**

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

Unconditional or Jumping Statements: The jump statements unconditionally transfer the control from one place to another place in a program. The jumping statements are-

1. ***break***
2. ***continue***
3. ***goto***
4. ***return***
5. ***exit***

break Statement: The break statement transfers the control to outside a loop or switch statement.

continue Statement: The continue statement transfers the control to the beginning of loop. It transfer the control to the increment/decrement in for loop and to the condition in while and do while loop.

Difference between break and continue statements

break	continue
1. It is used to exit from switch case or loop. **2.** It transfer the control to the first statement after the loop. **3.** It is used with loop and switch. **Example:** *void main()* *{* *int i;* *for(i=1;i<=10;i++)* *{* *if(i==5)* *break;* *printf("%d",i);* *}* *getch();* *}*	**1.** It is used to go to the beginning of a loop. **2.** It transfer the control to the iteration in for loop and to the condition in while and do while loop. **3.** It is used with loop. **Example:** *void main()* *{* *int i;* *for(i=1;i<=10;i++)* *{* *if(i==5)* *continue;* *printf("%d",i);* *}* *getch();* *}*

goto Statement: The goto statement is used to transfer the control from one place to another in a program. This statement uses a label.

Syntax:

Statement-1;
if(condition)

```
{
goto label;
}
Statement-2;
label:
Statement-3;
```

*Where **goto** is a keyword and **label** is an identifier (user defined name).*

- ✓ **Write a program to print 1 to 10 numbers using goto statement.**

```
#include<stdio.h>
#include<conio.h>
void main()
{
int i=1;
start:
printf("%d",i);
if(i<10)
{
i++;
goto start;
}
getch();
}
```

- ✓ **Write a program to calculate the square root of a number.**

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
void main()
{
float n,s;
read:
printf("Enter a number");
scanf("%d",&n);
if(n<0)
goto read;
s=sqrt(n)
printf("The square root of %f=%f",n,s);
getch();
}
```

return: This statement is used to transfer the control from the called function to the calling function with or without result.

exit(): This function is used to exit the control from the program execution.

- ✓ **Write a program to find the sum of following series:**

(i) $1^1 + 2^2 + 3^3 + 4^4 +$ ----------n^n.

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

```
printf("Eneter the number of terms");
scanf("%d",&n);
for(i=1;i<=n;i++)
{
s=s+pow(i,i);
}
printf("The Sum of the Series:=%d",s);
getch();
}
```

(ii) $X^1 + X^2 + X^3 + X^4 +$ ----------X^n.

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
void main()
{
int n,i,s=0;
printf("Eneter the number and range");
scanf("%d%d",&x,&n);
for(i=1;i<=n;i++)
{
s=s+pow(x,i);
}
printf("The Sum of the Series:=%d",s);
getch();
}
```

(iii) 1 + 2 – 3 + 4 – 5---------n.

```
#include<stdio.h>
#include<conio.h>
void main()
{
int n,i,s=1,sign= -1;
printf("Eneter the range");
scanf("%d",&n);
for(i=2;i<=n;i++)
{
sign=sign*(-1);
s=s+(i*sign);
}
printf("The Sum of the Series:=%d",s);
getch();
}
```

(iv) $X^1 + X^2 – X^3 + X^4 + X^5$--------- X^n.

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
void main()
{
int n,i,s,x,sign= -1;
printf("Eneter the range and value of x");
scanf("%d%d",&n,&x);
for(i=2;i<=n;i++)
```

```
{
sign=sign*(-1);
s=s+(pow(x,i)*sign);
}
printf("The Sum of the Series:=%d",s);
getch();
}
```

(v) 1/1! + 2/2! + 3/3! + ----------n/n!.

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
void main()
{
int n,i;
float s=0;
printf("Eneter the range");
scanf("%d",&n);
for(i=1;i<=n;i++)
{
s=s+(i/(float)fact(i));
}
printf("The Sum of the Series:=%f",s);
getch();
}
int fact(int n)
{
if(n==0)
return 1;
else
return(n*fact(n-1));
}
```

✓ **Write a program to print the following sequence of integers.**

(i) 0,5,10,15,20,25

```
#include<stdio.h>
#include<conio.h>
void main()
{
int i;
for(i=0;i<=25;i=i+5)
{
printf("%d,",i);
}
getch();
}
```

(ii) 0,2,4,6,8,10

```
#include<stdio.h>
#include<conio.h>
void main()
{
int i;
```

```
for(i=0;i<=10;i=i+2)
{
printf("%d,",i);
}
getch();
}
```

(iii) 1,2,4,8,16,32

```
 #include<stdio.h>
#include<conio.h>
void main()
{
int i;
for(i=0;i<=32;i=i*2)
{
printf("%d,",i);
}
getch();
}
```

(iv) -8 -6 -4 -2 0 2 4 6 8

```
 #include<stdio.h>
#include<conio.h>
void main()
{
int i;
for(i=-8;i<=8;i=i+2)
{
printf("%d",i);
}
getch();
}
```

Nested Loop: A loop which is inside the body of another loop is called nested loop.

- ✓ **Write a program to print following patterns.**

(i). *

* *

* * *

* * * *

* * * * *

```
#include<stdio.h>
#include<conio.h>
void main()
{
int i,j;
for(i=1;i<=5;i++)
{
for(j=1;j<=i;j++)
{
printf("*");
}
printf("\n");
}
getch();
}
```

(ii). A

B A

A B A

B A B A

A B A B A

```
#include<stdio.h>
#include<conio.h>
void main()
{
int i,j;
for(i=1;i<=5;i++)
{
for(j=1;j<=i;j++)
{
if((i+j)%2==0)
printf("A");
else
printf("B");
}
printf("\n");
}
getch();
}
```

(iii). 1

2 2

3 3 3

4 4 4 4

5 5 5 5 5

```
#include<stdio.h>
#include<conio.h>
void main()
{
int i,j;
for(i=1;i<=5;i++)
{
for(j=1;j<=i;j++)
{
printf("%d\t",i);
}
printf("\n");
}
getch();
}
```

(iv).5

5 4

5 4 3

5 4 3 2

5 4 3 2 1

```
#include<stdio.h>
#include<conio.h>
void main()
{
int i,j;
for(i=5;i>=1;i--)
{
for(j=1;j<=i;j++)
{
printf("%d\t",i);
}
printf("\n");
}
getch();
}
```

(v).

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

```
#include<stdio.h>
#include<conio.h>
void main()
{
int i,j,k;
for(i=1;i<=5;i++)
```

```
{
for(j=5;j>i;j--)
printf(" ");
for(k=1;k<=2*i-1;k++)
printf("*");
printf("\n");
}
getch();
}
```

List of programs to practice (Home work)

1. **Write a program to display numbers 1 to 10.**
2. **Write a program to display all even numbers from 1 to 20**
3. **Write a program to display all odd numbers from 1 to 20**
4. **Write a program to print all the Numbers Divisible by 7 from 1 to 100.**
5. **Write a program to print table of 2.**
6. **Write a program to print table of 5.**
7. **Write a program to print table of any number.**
8. **Write a program to print table of 5 in following format.**

5 X 1 = 5

5 X 2 = 10

5 X 3 = 15

9. **Write a program to Find the Sum of first 50 Natural Numbers using for Loop.**
10. **Write a program to calculate factorial of a given number using for loop.**
11. **Write a program to calculate factorial of a given number using while loop.**
12. **Write a program to calculate factorial of a given number using do-while loop.**
13. **Write a program to count the sum of digits in the entered number.**
14. **Write a program to find the reverse of a given number.**
15. **Write a program to Check whether a given Number is Perfect Number.**
16. **Write a program to Print Armstrong Number from 1 to 1000.**

17. Write a program to Compute the Value of X ^ N

18. Write a program to Calculate the value of nCr

19. Write a program to generate the Fibonacci Series

20. Write a program to Print First 10 Natural Numbers

21. Write a program to check whether a given Number is Palindrome or Not

22. Write a program to Check whether a given Number is an Armstrong Number

23. Write a program to Check Whether given Number is Perfect or Not

24. Write a program to check weather a given number is prime number or not.

25. Write a program to print all prime numbers from 50-500

26. Write a program to find the Sum of all prime numbers from 1-1000

27. Write a program to display the following pattern:

*** * * * ***

*** * * * ***

*** * * * ***

*** * * * ***

*** * * * ***

28. Write a program to display the following pattern:

*****

*** ***

*** * ***

*** * * ***

*** * * * ***

29. Write a program to display the following pattern:

1

1 2

1 2 3

1 2 3 4

1 2 3 4 5

30. Write a program to display the following pattern:

1

2 2

3 3 3

4 4 4 4

5 5 5 5 5

31. Write a program to display the following pattern:

A

B B

C C C

D D D D

E E E E E

32. Write a program to display the following pattern:

*** * * * ***

*** * * ***

*** * ***

*** ***

*****

33. Write a program to display the following pattern:

1 2 3 4 5

1 2 3 4

1 2 3

1 2

1

34. Write a program to display the following pattern:

*

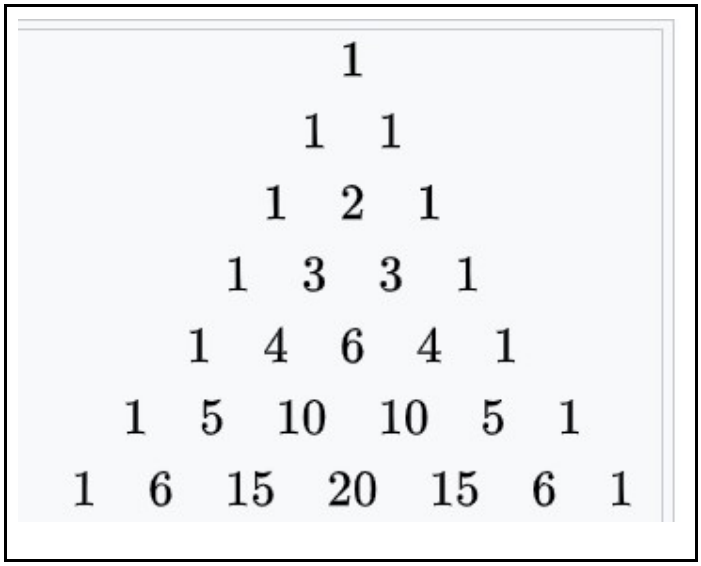
* * *

* * * * *

* * * * * * *

* * * * * * * * *

35. Write a program to display the following pattern (Pascal Triangle):



41. Write a program to display the following pattern:

1

2 3

4 5 6

7 8 9 10

36. Write a program to display the following pattern:

A

B A B

A B A B A

B A B A B A B

37. Write a program to display the following pattern:

1

0 1 0

1 0 1 0 1

0 1 0 1 0 1 0

38. Write a program to display the following pattern:

A B C D E F G F E D C B A

A B C D E F F E D C B A

A B C D E E D C B A

A B C D D C B A

A B C C B A

A B B A

A A

39. Write a program to display the following pattern:

****

**** ****

***   ***

**   **

*   *

40. Write a program to display the following pattern:

0

01

010

0101

01010

41. Write a program to display the following pattern:

```
1          1
12        21
123      321
1234    4321
12345 54321
```

42. Write a program to display the following pattern:

A

B C

D E F

G H I J

K L M N O

43. Write a program to display the following pattern:

A

BAB

CBABC

DCBABCD

EDCBABCDE

44. Write a program to display the following pattern:

1A2B3C4D5E

1A2B3C4D

1A2B3C

1A2B

1A

45. Write a program to display the following pattern:

0

1 0 1

2 1 0 1 2

3 2 1 0 1 2 3

4 3 2 1 0 1 2 3 4

46. Write a program to print the following sequence of integers.

0, 5, 10, 15, 20, 25

47. Write a program to print the following sequence of integers.

0, 2, 4, 6, 8, 10

48. Write a program to Find the Sum of A.P Series.

49. Write a program to Find the Sum of G.P Series.

50. Write a program to Find the Sum of H.P Series.

51. Write a program to print the following sequence of integers.

1, 2, 4, 8, 16, 32

52. Write a program to print the following sequence of integers.

-8, -6, -4, -2, 0, 2, 4, 6, 8

53. Write a program to find the Sum of following Series:

1 + 2 + 3 + 4 + 5 + ... + n

54. Write a program to find the Sum of following Series:

(1*1) + (2*2) + (3*3) + (4*4) + (5*5) + ... + (n*n)

55. Write a program to find the Sum of following Series:

(1) + (1+2) + (1+2+3) + (1+2+3+4) + ... + (1+2+3+4+...+n)

56. Write a program to find the Sum of following Series:

1! + 2! + 3! + 4! + 5! + ... + n!

57. Write a program to find the Sum of following Series:

(1^1) + (2^2) + (3^3) + (4^4) + (5^5) + ... + (n^n)

58. Write a program to find the Sum of following Series:

(1!/1) + (2!/2) + (3!/3) + (4!/4) + (5!/5) + ... + (n!/n)

59. Write a program to find the Sum of following Series:

[(1^1)/1] + [(2^2)/2] + [(3^3)/3] + [(4^4)/4] + [(5^5)/5] + ... + [(n^n)/n]

60. Write a program to find the Sum of following Series:

[(1^1)/1!] + [(2^2)/2!] + [(3^3)/3!] + [(4^4)/4!] + [(5^5)/5!] + ... + [(n^n)/n!]

61. Write a program to find the Sum of following Series:

1/2 - 2/3 + 3/4 - 4/5 + 5/6 - ..... upto n terms

62. Write a program to print the following Series:

1, 2, 3, 6, 9, 18, 27, 54, ... upto n terms

63. Write a program to print the following Series:

2, 15, 41, 80, 132, 197, 275, 366, 470, 587

64. Write a program to print the following Series:

1, 3, 8, 15, 27, 50, 92, 169, 311