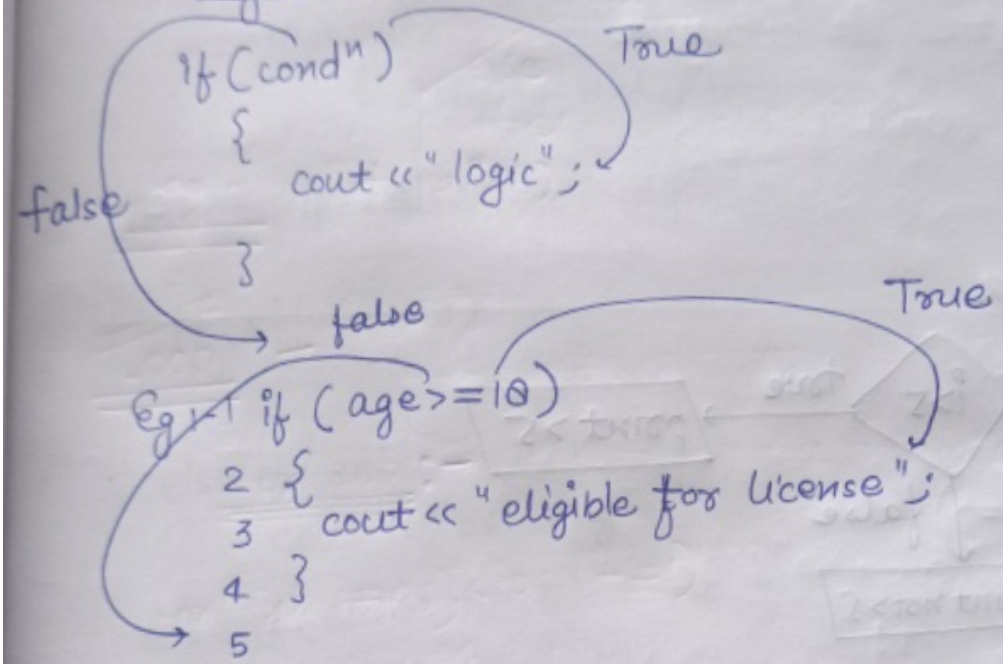
* Conditionals and Loops :-

(I) if (condition)

```
if (bhaicount == 0)
  {
    cout << "can approach";
  }
```

condition

Syntax :-



Ques. balance :-

```
if (balance >= 10)
  {
    cout << "Maagi";
  }
```

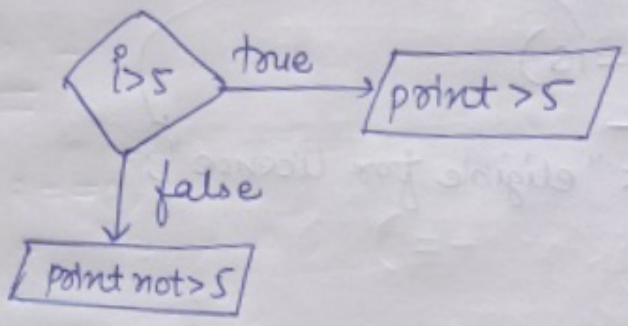
(II) if else

```
if (balance >= 10)
  {
    cout << "Maagi";
  }
else
  cout << "Kuchure";
```

if else block :

Syntax

```
if (condn)
 {
   // logic
 }
else
  {
   // logic
  }
```




```
if(i>5)
{
 cout << " >5";
}
else
   cout << " not >5";
```

Code :- sides==3

true → print triangle

```
if (sides==3)
 {
   cout << " triangle";
 }
else
   cout << " not triangle";
```

Eg:- sides == 4
↳ triangle

sides == 4
↳ rectangle

sides == 5
↳ pentagon

otherwise
↳ mujhe nhi pta

* if else if- else

```
if(sides==3)
    cout<<" triangle";

else if(sides==4)
    cout<<" rectangle";

else if(sides==5)
    cout<<" pentagon";

else cout<<" mujhe nhi pta";
```

---

if else if else

```
if (cond")
 {

 }
elseif (cond")
 {

 }
else if (cond")
 {

 }
else if (cond")
 {
 }
```

→ optional

```
else
{

}
```

```
if(n>0)
 {
   cout<<" +ve No";
 }
else if(n<0)
  {
    cout<<"-ve No";
  }
else
    cout<<" zero";
}
```

Ques: i/p ⟶ n

```
int n;
cin>>n;
if(n % 2==0)
    cout<<" Even No";
 else
    cout<<" Odd";
```

①
```
if(condn)
 {
 }
```

②
```
if(condn)
 {
 }
if(condn)
 {
 }
if(condn)
 {
 }
```

③
```
if(condn)
  {
    if(condn)
      {
      }
  }
```

④ if (condA && condB - - -)
{
}

Ques a = 5
b = 10
c = 15

5 > 5

```
if (a>5)
{
  if (c>10)
  {
    cout << "Sainik";
  }
}
else
 { if (b==10)
    { if(c>=10)
      {
        cout<< "Sipahi";
      }
    }
 }
```

Sipahi

Eg:-

```
int main()
{
  int age = 10
  if (age < 10)
    {
      cout << "Hello Jee";
    }
  cout << "Hi Everyone";
}
```

Hello Jee
Hii Everyone

---

* Loop :-

- for
- while
- do-while
- for-each

* For loop Syntax :-

```
for(int i=0 ; i<10 ; i+=1)
    {
      cout << "Babbar"; ——→ Logic
    }
```

(initialization → condition → updation)

Dry Run:

```
for(int i=1; i<=5; i=i+1)
{
  cout << "Babbar";
}
```

A → B → C → B (T) → A

i = 1
1 <= 5 → true
Babbar
i = i+1 = 1+1 = 2
2 <= 5 → true
Babbar
i = i+1 = 2+1 = 3
3 <= 5
Babbar
i = i+1 = 3+1 = 4
4 <= 5
Babbar
i = i+1 = 4+1 = 5
Babbar

false → Babar

Eg ②.

```
for(int i=0; i<5; i++)
{
  cout << i;
}
```

A → B → A (T) → B

i = 0, 0 < 5 → true
0
i = 1, 1 < 5 → true
0 1
i = 2 2 < 5 → true
0 1 2
i = 3 3 < 5 → true
0 1 2 3
i = 4 4 < 5 → true
0 1 2 3 4

Eg ③

```
for(int i=10; i<=12; i=i+1)
{
  cout << "Monica, My Darling";
}
```

10 10 <= 12
Monica, My Darling
11 11 <= 12
Monica, My Darling
12 12 <= 12
Monica My Darling
13 13 <= 12
(false)

```
for (int i = 1 ; i<=10 ; i=i+1)
  {
  cout<<i<<endl;
  }
```

```
2
4
6
8
```

```
for(int i=2; i<10; i+=2)
    {
      cout<<i;
    }
```

→ false

i=10 10<10
i=8 8<10
i=6 6<10
i=2 2<10
i=4 4<10

2 4 6 8

Eg:-

```
for(int i=10  i>=0; i=i-1)
    {
    cout<<i<<endl;
```

10 10>=0

10 9 8 7 6 5 4 3 2 1 0

* Nested Loop :-

```
for(int i=0 ; i<3 ; i+=1)
  {
    cout<<"outer loop"<<i<<endl;
    for (int j=0 ; j<3 ; j=j+1)
      {
        cout<<"inner loop"<<j<<endl;
      }
  }
```

i=0 ⟶ 0<3 ⟶ True

"Outer loop 0"

j=0, 0<3 ⟶ true

Inner loop 0

j=1, 1<3 ⟶ true

Inner loop 1

j=2, 2<3 ⟶ true

Inner loop 2

j=3, 3<3 ⟶ false

i=i+1, 1<3 ⟶ true

"Outer loop 1"

j=0 ; 0<3 ✓

Inner loop 0

j=1 1<3

Inner loop 1

j=2 2<3

Inner loop 2

j=3 3<3 ⟶ false

i=2 2<3

outer loop 2

j=0 0<3

Inner loop 0

j=1 1<3

Inner loop 1

j=2 2<3

Inner loop 2

```
for(int i=0; i<5; i+=1)
    {
      cout << "Hi";
    }
```

```
int main()
{
  int i=1;
  for( ; ; i=i+1)
   { if(i<5)
      {
       cout << "Babbar";
      }
   i=i+1;
}
```

```
for(int i=0; i<5; i=i+1)
   {
     cout << "i";
   }
```

① 11 baar ⟶ Name

② 19 ka table ⟶ print

1 ⟶ 100 ⟶ Even no ⟶ print

①
```
for(int i=1; i<=11; i++)
    cout<<"Shivanshu";
```

②
```
int n=19
for(int i=1; i<=10; i++)
{
  n=n*i;
  cout<<n;
}
```

```
for(int i=1; i<=100; i++)
{
  if(i%2==0)
    cout<<i<<endl;
}
```

19×1
19×2

n = n × i

n = 19 × 1 = 19

n = 19 × 2 = 30

19×1
19×2
19×3
19×4
19×5
} loop 10

```
int n=19
for(int i=1; i<=10; i++)
{
  cout<<n*i<<endl;
}
```

1 1<=10

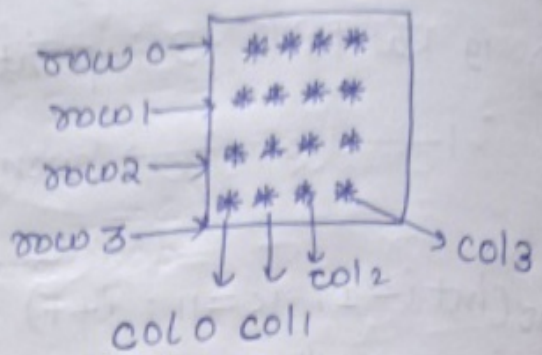
19 × 1 ⟶ 19

i=2 2<10

19 × 2

* Pattern Printing :-

(I) ~~Rectang~~ Square Pattern :-



① find no of rows ⟶ ④

② write docon for each row

row 0 ⟶ 4 star
row 1 ⟶ 4 star
row 2 ⟶ 4 star
row 3 ⟶ 4 star

row ⟶ 4
logic ⟶ 4 star

```
for(int row=0 ; row<4; row+=1)
   {
      for(int col=0; col<4 ; col+=1)
          {
            cout << "*";
          }
    cout <<endl;
   }
```

```
for(int i=0; i<4 ; i+=1)
  {
    for(int j=0; j<4; j+=1)
     {
       cout<<"*";
     }
    cout<< endl;
  }
```

Rectangle :-

row 0 * * * * *
row 1 * * * * *
row 2 * * * * *

① row = 3 ⟶ outer loop ⟶ 3 [0 1 2]

② row 0 ⟶ 5 *
row 1 ⟶ " "
row 2 ⟶ 5 "

inner loop ⟶ 5 star print

```
for(int i=0 ; i<3 ; i+=1)
  {
    for(int j=0; j<5; j+=1)
     {
       cout<<"*";
     }
    cout<< endl;
  }
```

* Square :-

row 0 * * *
row 1 * * *
row 2 * * *

① count rows ⟶ outer loop

② row 0 ⟶ 3 star
row 1 ⟶ 3 star
row 2 ⟶ 3 star
⟶ ∀ row ⟶ 3 stars → Inner loop

```
for(int i=0; i<3; i+=1)
  {
    for(int j=0; j<3; j++)
      {
        cout << "*";
      }
    cout << endl;
  }
```

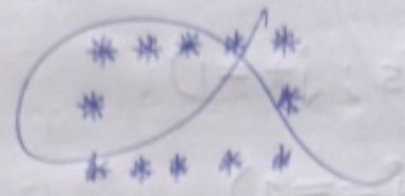
* Rectangle :-

row 0 * * * * * *
row 1 * * * * * *
row 2 * * * * * *

① row 3
② row 0 ⟶ 6 star
row 1 ⟶ " "
row 2 ⟶ " "

```
for(int i=0; i<3; i++)
    { for(int j=0; j<6; j+=1)
        { cout << "*";
    cout << endl;
```

Eg ③ Hollow rectangle :-



```
for(int i=0; i<5; i+=1)
  {
    if(i==0 || i==4)
    {
      for(int j=0; j<5; j+=1)
        {
          cout<<"*";
        }
    }
    else
    {
      cout<<"*";
      for(int j=1; j<4; j+=1)
        {
          cout<<" ";
        }
      cout<<"*";
    }
  cout<<endl;
}
```

```
for(int i=0; i< 5 ; i+=1)
  {
    for(int j=0; j<5; j+=1)
     { if( i==0 || i==4)
          cout << "*";
       else
          cout <<
for(int row=0; row<5; row+=1)
      {
        for(int col=0; col<5; col+=1)
          {
            if (row==0 || row==4)
              {
                cout << "*";
              }
            else
              {
                if(col==0 || col==4)
                    cout<< "*";
                else
                    cout<< " ";
              }
          }
        cout<<endl;
      }
```

Hollow :

```
int main()
{
  int Rows = 10;
  int Cols = 7;
  for(int row=0; row< Rows; row+=1)
    {
      for(int col=0; col< Cols; col+=1)
        {
          if (row==0 || row== Rows-1)
              cout << "*";
          else
            {
              if(col==0 || col== Cols-1)
                  { cout << "*";
              else}
                  cout << " ";
        }
      cout<<endl;
    }
```

Ques. Half Pyramid :-

```
row 0   *
row 1   * *
row 2   * * *
row 3   * * * *
row 4   * * * * *
```

row 0 ⟶ 1 star
row 1 ⟶ 2 star
row 2 ⟶ 3 "
row 3 ⟶ 4 "

```
for(int row=0 ; row<5 ; row+=1)
   {
     for(int col=0 ; col<row+1 ; col+=1)
          {
            cout << "*";
          }
     cout << endl;
   }
```

Ques Inverted Half Pyramid :-

```
row 0   * * * * *
row 1   * * * *
row 2   * * *
row 3   * *
row 4   *
```

(n=5)

row 0 ⟶ 5 star
row 1 ⟶ 4 star
row 2 ⟶ 3 star
row 3 ⟶ 2 star
row 4 ⟶ 1 star

```
for (int row=0; row<5; row+=
   {
for(int col=0; col< n-row
                  col+=1)
   {
     cout << " *";
   }
cout << endl;
```

Ques

Dry Run :- $n=5$

row = 0 — 0 < 5 — 5 → 0

col = 0 — 0 < 5 — 1

* * * * *

Ques. Numeric Half Pyramid :-

row 0 = 1
row 1 = 1 2
row 2 = 1 2 3
row 3 = 1 2 3 4
row 4 = 1 2 3 4

col0 col1 col2 col3

```
for(int row=0; row<5; row+=1)
{
    for(int col=0; col<row+1;
                col+=1)
    {
        cout << col+1;
    }
    cout << endl;
}
```

Ques. Inverted Numeric Half Pyramid :-

(n=5)

```
row 0    1 2 3 4 5      row 0 → 5 char
row 1    1 2 3 4        row 1 → 4 char
row 2    1 2 3          row 2 → 3 char
row 3    1 2            row 3 → 2 char
row 4    1              row 4 → 1 char
```

col 5, col 4, col 3, col 2, col 1, col 0

```
for(int row=0; row<n; row+=1)
  {
    for(int col=0; col<n-row; col+=1)
      {
        cout<<col+1;
      }
    cout<<endl;
  }
```