Loop structure / Iterative structure

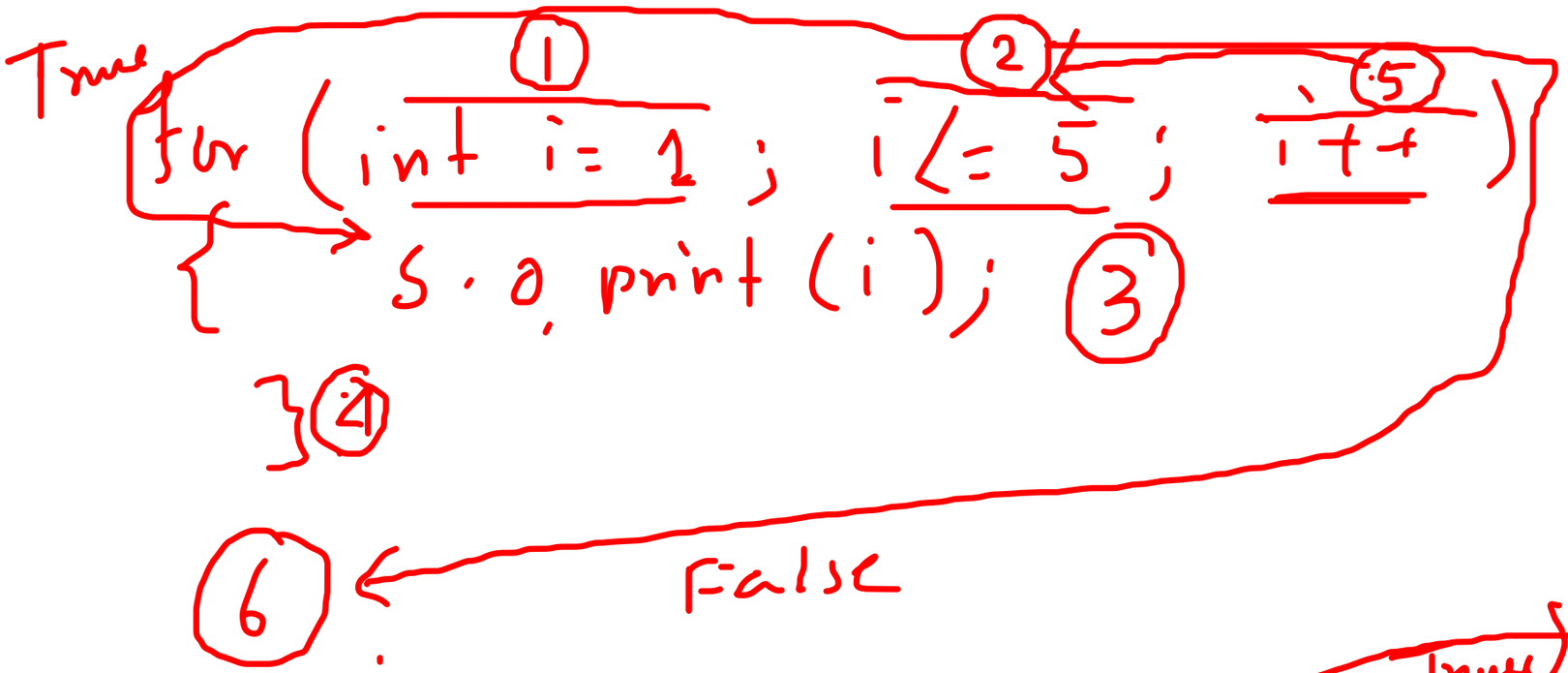
Def: Repeated execution of a statement or a group of statement is called a Loop.

Java provides three types of Loop structure

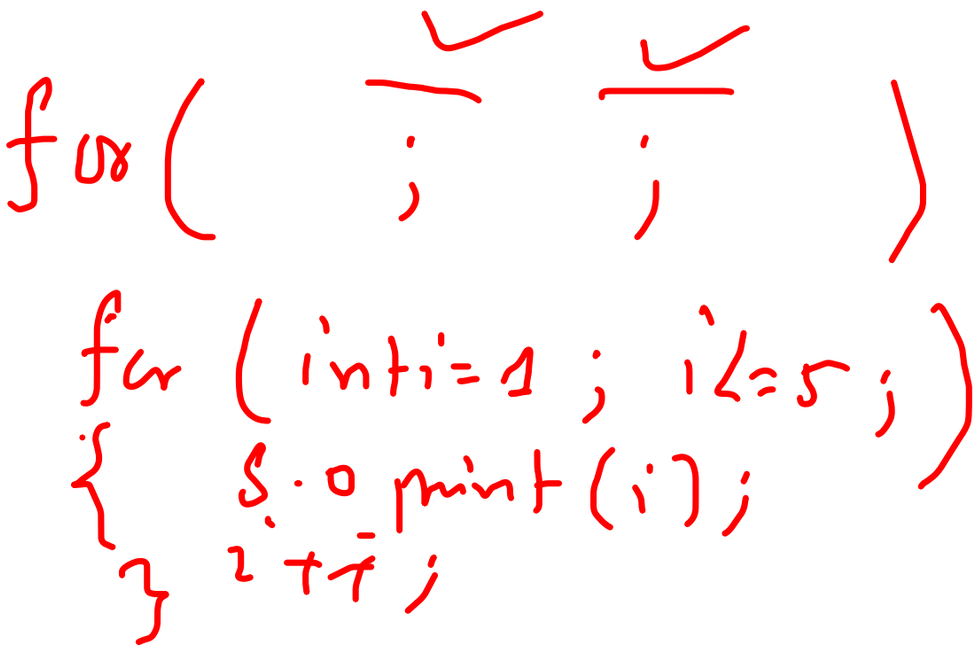
i) for (---) } entry control loop
ii) while (--) }
iii) do --- while() → exit control loop.

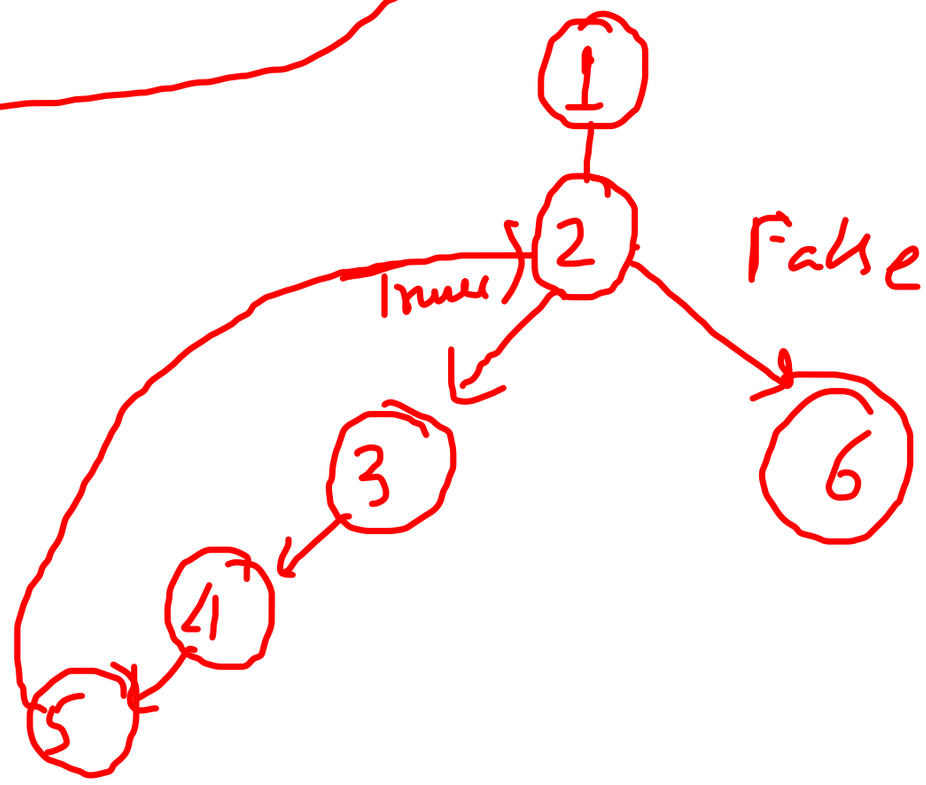
General syntax of for() loop.

```
for (initialization ; test expression ; updation)
{
  ----
  ----
}
```


True
1
2
5
for (int i = 1 ; i <= 5 ; i++)
{
S.o.print(i); 3
}
4
6
False

1, 2, 3, 4, 5


for (; ;)
for (int i=1 ; i<=5 ;)
{
S.o.print(i);
} i++;


1
2
True
False
3
4
5
6

Appln. of for loop:

1) To find the factrial of a number
   $4! = 1 \times 2 \times 3 \times 4 = 24$
2) To display each term and sum of the series $x - x^2 + x^3 - x^4$
3) To display each tem and sum of fibonacci: Series. 1, 1, 2, 3, 5, ----
4) To check a number prime or cmpsite.
5) To check a number is Pafcet or not.
6) $\frac{x}{2} - \frac{2x^2}{3} + \frac{3x^3}{4}$ ----

Find the output:

1)
```
int i, a = 5, b = 10 ;
for ( i = a ; i <= b ; i += 2 )
    { a = a + i ;
    }
S.o print ( a + i );
```

i	a
5	10
7	17
9 ✓	26
11	

26 + 11 = 37 ✓

2)
```
for ( i = 15 ; i >= 3 ; i -= 4 )
    S.o print ( i % 3 ) ;
    S.o print ( i / 2 + i % 3 ) ;
```

i
15
11
7
3
-1

Display
0 ✓
2 ✓
1 ✓
0
-1

LCV → Loop Cntrol Variable

Prime number-

```
void main(int num)
{
    int i, count=0 ;
for (i=1; i<=num; i++)
{   if (num % i == 0)
        count++; }
if (count == 2)
    S.o.pln("prime");
else  S.o.pln("Composite");
}
```

Perfect number 6 → 1+2+3
28 →

```
void main (int num)
{  int i, sum=0 ;
for (i=1; i<num; i++)
  if (num % i==0)
    sum = sum + i;
if (sum == num)
    S.o.pln("perfect");
else S.o.pln("Not perfect");
  }
```

$x - x^2 + x^3 - x^4 + \cdots x^n$

```
void main (int x, int n)
{ int i, sign = 1, sum = 0, term;
  for (i = 1; i <= n; i++)
  { term = (int) Math.pow (x, i) * sign;
    S.O.print (term + " " ); x
    sum = sum + term; sign = sign * -1;
  }
  S.O.println("Sum = " + sum);
}
```

```
double term, sum = 0
term = i * Math.pow(x, i) / (i+1) * sign
```

```
Void main (int n)
{
  int i, a=1, b=0, c, j
  for (i=1; i<=n; i++)
  {
    c = a + b;
    S.O.P(c);
    a = b;
    b = c;
    sum = sum + c;
  }
  S.O.println("Sum = " + sum);
}
```

sum = 0

n = 10

1, 1, 2, 3, 5, 8, 13, 21, 34, 55

Today upto n (10)

1, 1, 2, 3, 5, 8

(*) if(c <= n)
{ S.O.P(c);
sum = sum + c;
}

For Loop prog: (contd)

① WAP to display each term and sum of the series $1! + 2! + 3! \cdots + n!$

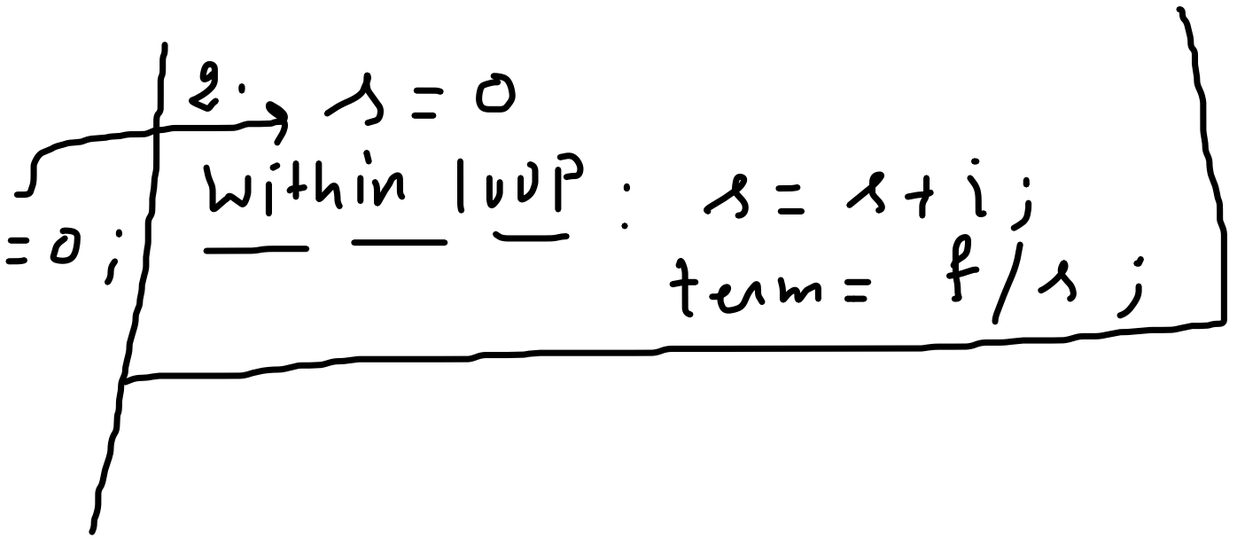
② WAP to display each term and sum of the following series. $1 + \frac{1\times2}{1+2} + \frac{1\times2\times3}{1+2+3} + \cdots + n$th term

③ WAP to print all the fibonacci term upto a given value.

④ WAP to find hcf of two number

⑤ WAP to find lcm of two number.

1. void main(int n)
{ int i, f=1, term, sum=0;
for(i=1; i<=n; i++)
{ f=f*i;
term=f;
S.o.p(term + " ");
sum = sum + term;
}
S.o.println("sum = " + sum);
}



$1! + \underline{2!} + \underline{3!} + 4!$

$\underline{1\times2} \quad \underline{1\times2\times3}$