C++
Problems on Loops

Lecture- 6

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Break;

```
break;

for (int i= 0;  i <10 ; i++){

    ——  —  —  —

}
```

Ques : WAP to check if a number is prime or not.

P → P
P → 1

it has no factors other than 1 & the number itself

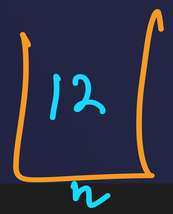
1) Composite hai ya nahi. → Break ;

12 → Composite → 1, 12 , 2, 3, 4, 6

n → loop i = 2 to n-1

if (n % i == 0) → i is a factor

Ques : WAP to check if a number is ~~prime~~ composite or not.




```cpp
int n;
cout<<"Enter a number : ";
cin>>n;
for(int i=2;i<=n-1;i++){
    if(n%i==0){
        cout<<n<<" is a composite number"<<endl;
    }
}
```

12 → 1, 2, 3, 4, 6, 12

Output / Input

- Enter a number : 12
- 12 is a composite no.
- 12 is a compos...
- 12 is a composite no.

Ques : WAP to check if a number is ~~prime~~ composite or not.

```
for (int i=2 ; i<=n-1 ; i++){
    if (n%i ==0){
        cout<<n<<" is a composite no";
        break;
    }
}
```

Ques : WAP to check if a number is prime or not.

Using boolean → store the state

Continue;

break ;

continue;

Ques : WAP to print odd numbers from 1 to 100.

```
for (int i =1 ; i<=10; i++){
    if (i%2==0) continue;
    cout << i << endl;
}
```

skip this round/ iteration

Output

1

Predict the Output Problems

Predict the output

```
int main( ) {
      while ( 'a' < 'b' )
            cout << “malayalam is a palindrome"  << endl ;
}
```

97 98

Output

- malayalam is . . .
- segmentation fault , infinite loop

Predict the output

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

condition

i

10 11 10 11 10

a >= b

a == b

a != b

a <= b

a > b

a < b

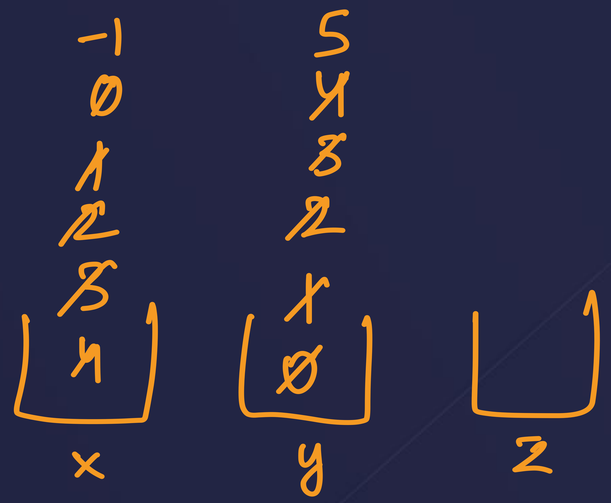
Output

- 10
- 10
-

Infinite loop

Predict the output

```
int main( ) {
    int x = 4, y = 0, z ;
    while ( x >= 0 ) {
        x-- ;
        y++ ;
        if ( x == y )
            continue ;
        else
            cout << x << " " << y << endl ;
    }
}
```



Output

- 3 1
- 1 3
- 0 4
- -1 5
-

Predict the output

```
int main( ) {
    int x = 4, y = 0, z ;
    while ( x >= 0 ) {
        if ( x == y )
            break ;
        else
            cout << x << " " << y << endl ;
            x-- ;
            y++ ;
    }
}
```

x = 4 3 2

y = 0 1 2

Output

- 4 0
- 3 1

Predict the output

```
int main( ) {
      int t = 10;
      while(t/=2){
            cout << “Hello” << endl;
      }
}
```

t = 10 5 2 1

Output

- Hello
- Hello
- Hello

Questions using Operators

+ - * / %

Ques : WAP to count digits of a given number.

int n = 1971 → 4

45312 → 5

9 9 9 9 8 8 1 2 4 7 → 10

#Hint

1) 'int' ki baat ho rahi hai

2) n ko 10 se divide kar doon

Algorithm :

n = 1971

count = 0

n /= 10 → n → 197

count ++ → count → 1

n /= 10 → n = 19

count → 2

n = 1

count = 3

n = 0

count = 4

```cpp
int n;
cout<<"Enter a number : ";
cin>>n;
int count = 0;
int a = n;
while(n>0){
    n/=10;
    count++;
}
if(a==0) cout<<1;
else cout<<count;
```

n = 1971 197 19 1 0

count = 0 1 2 3 4

a = 1971

Output

Enter a number : 1971

4

Ques : WAP to print sum of digits of a given number.

$n = 9874$

$Sum = 9+8+7+4 = 4+7+8+9$

$lastDigit = 9874 \% 10 = 4$

Steps → 1) LastDigit
2) Sum += lastdigit
3) n /= 10

Condition → n > 0

Algorithm

n =	9874	987	98	9	0
lastDigit =	4	7	8	9	
Sum =	0	4	11	19	28

$1 \% 10 = 1$

Ques : WAP to print reverse of a given number. n = 9874 r = 4789

Algorithm

n = 9874 987 98 9 0

lastDigit = 4 7 8 9

r = 0 0 4 40 47 470 478 4780 4789

Steps (n>0)

1) r = r * 10;
2) lastDigit → n%10
3) r += lastDigit
4) n/=10

```
while(n>0){
    lastDigit = n%10;
    reverse += lastDigit;
    reverse*=10;
    n/=10;
}
```

n = 123 12 1 0

r = 0 3 30 32 320 321 3210

lastDigit = 0 3 2 1

```
while(n>0){
    lastDigit = n%10;
    reverse*=10;
    reverse += lastDigit;
    n/=10;
}
```

n = 123 12 1 0

r = 0 0 3 30 32 320 321

lastDigit = 0 3 2 1

Ques : Print the sum of this series : 1 - 2 + 3 - 4 + 5 - 6... upto 'n'.

```
Sum = 0        for (int i=1 ; i<=n ; i++){
                   if (i % 2 != 0)  sum += i ;
                   else  sum -= i ;
               }
```

1) If n is even → (1-2) + (3-4) + (5-6) + (7-8) ... ((n-1)-n)

-1 + -1 + -1 + -1 ... +-1

n/2 times

Sum = $-\frac{n}{2}$;

Ques : Print the sum of this series : 1 - 2 + 3 - 4 + 5 - 6... upto 'n'.

2) if n is odd for ex → n = 7

$$(1-2) + (3-4) + (5-6) + 7$$

$$-1 + -1 + -1 + 7$$

$\frac{n}{2}$ times

$$\text{Sum} = -\frac{n}{2} + n \neq \frac{n}{2}$$

* Ques : Print the factorial of a given number ‘n’.

$5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$ 1 to n ka product

$3! = 3 \times 2 \times 1$

$n! = n \times (n-1)!$

$2! = 2 \times 1$

$n! = n \times n-1 \times n-2 \times \ldots 3 \times 2 \times 1$

$1! = 1$

$0! = 1$

Ques : Print the nth fibonacci number.

	1	1	2	3	5	8	13	21	34	55	89 ...
n =	1	2	3	4	5	6	7	8	9	10	11

$$fibo(n) = fibo(n-1) + fibo(n-2)$$

Algorithm :

a	=	1	1	2	3	5
b	=	1	2	3	5	8
Sum	=	2	3	5	8	

Steps

1) sum = a + b
2) a = b
3) b = sum

Ques : Two numbers are entered through the keyboard. Write a program to find the value of one number raised to the power of another.

```
int a, b;
cin >> a >> b;
```

$a^b = ?$

```
int power = 1;
```

$$a^b = \underbrace{a \times a \times a \times a \cdots}_{b \text{ times}}$$

$$a^{-b} = \frac{1}{a^b}$$ C.W.

$$2^{-2} = \frac{1}{2^2} = \frac{1}{4} = 0.25$$

THANK YOU