

C++

Problems on Loops

Lecture- 6

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Break;

```
break;
```

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

```
    _ _ _ _
```

```
}
```

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

$p \rightarrow p$
 \searrow
 1

\downarrow
 it has no factors
 other than 1 & the
 number itself

1) Composite hai ya nahi. \rightarrow Break ;

12 \rightarrow Composite \rightarrow 1, 12 , 2, 3, 4, 6

$n \rightarrow$ loop $i=2$ to $n-1$

if $(n \% i == 0) \rightarrow$ i is a factor

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

12
~

```
✓ 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

Composite

Output / Input

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

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

composite

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

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

Using boolean \rightarrow store the state

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Continue;

break ;
continue ;

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

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

skip this round/
iteration

Output

1
3
5
7
9
11
13
15
17
19
21
23
25
27
29
31
33
35
37
39
41
43
45
47
49
51
53
55
57
59
61
63
65
67
69
71
73
75
77
79
81
83
85
87
89
91
93
95
97
99

Predict the Output Problems

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Predict the output

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

Output

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

Predict the output

```
int main() {
```

```
    ✓ int i;
```

```
    while (i = 10) {
```

```
        cout << i << endl;
```

```
        i = i + 1;
```

```
    }
```

```
}
```

$a > b$

$a < b$

$a \geq b$

$a == b$

$a != b$

$a \leq b$

→ Condition

10
10
10

Output

• 10

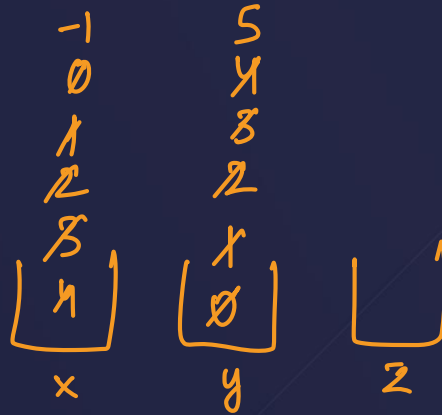
• 10

•

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++;
```

```
    }
```

```
}
```

z = 1 2

y = 1 2

Output

• 4 0

• 3 1

Predict the output

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

$t = 10 \rightarrow 5 \rightarrow 2 \rightarrow 1$

Output

- Hello
- Hello
- Hello

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Questions using Operators

$+$ $-$ $*$ $/$ $\%$

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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


```
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

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Ques : WAP to print sum of digits of a given number. $n = 9874$

$$\text{Sum} = 9 + 8 + 7 + 4 = 4 + 7 + 8 + 9$$

$$\text{lastDigit} = 9874 \% 10 = 4$$

Algorithm

$$n = \cancel{9874} \quad \cancel{987} \quad \cancel{98} \quad \cancel{9} \quad 0$$

$$\text{lastDigit} = \cancel{4} \quad \cancel{7} \quad \cancel{8} \quad 9$$

$$\text{Sum} = \cancel{0} \quad \cancel{4} \quad \cancel{11} \quad \cancel{19} \quad 28$$

$$1 \% 10 = 1$$

Steps → Condition → $n > 0$

1) LastDigit

2) $\text{Sum} += \text{lastDigit}$

3) $n /= 10$

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

Algorithm

$n = 9874$ ~~987~~ ~~98~~ ~~9~~ 0
 lastDigit = 0 ~~4~~ ~~8~~ ~~7~~ 9
 $r = 0$ ~~0~~ 4 40 ~~47~~ 470 478
 4780 **4789**

Steps ($n > 0$)

- 1) $r = r * 10;$
- 2) lastDigit $\rightarrow n \% 10$
- 3) $r += \text{lastDigit}$
- 4) $n /= 10$

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

$n = 123 \rightarrow 12 \rightarrow 1 \rightarrow 0$

$r = 0 \rightarrow 3 \rightarrow 30 \rightarrow 32 \rightarrow 320 \rightarrow 321 \rightarrow 3210$

$lastDigit = 0 \rightarrow 3 \rightarrow 2 \rightarrow 1$

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

$n = 123 \rightarrow 12 \rightarrow 1 \rightarrow 0$

$r = 0 \rightarrow 0 \rightarrow 3 \rightarrow 30 \rightarrow 32 \rightarrow 320 \rightarrow 321$

$lastDigit = 0 \rightarrow 3 \rightarrow 2 \rightarrow 1$

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Ques : Print the sum of this series :
 $1 - 2 + 3 - 4 + 5 - 6 \dots$ 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 $\rightarrow (1-2) + (3-4) + (5-6) + (7-8) \dots (n-1-n)$

$-1 \quad + \quad -1 \quad + \quad -1 \quad + \quad -1 \quad \dots \quad + \quad -1$
 $\underbrace{\hspace{15em}}_{n/2 \text{ times}}$

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

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

2) if n is odd for ex $\rightarrow n = 7$

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

$$\underbrace{-1 + -1 + -1}_{\frac{n}{2} \text{ times}} + 7$$

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

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

$$5! = 5 \times 4 \times 3 \times 2 \times 1 = 120 \quad \downarrow \quad \text{1 to n ka product}$$

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

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

$$2! = 2 \times 1$$

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

$$1! = 1$$

$$0! = 1$$

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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	

$$\text{fibonacci}(n) = \text{fibonacci}(n-1) + \text{fibonacci}(n-2)$$

Algorithm :

a = 1 1 2 3 5

b = 1 2 3 5 8

Sum = 0 2 3 5 8

Steps

1) $\text{sum} = a + b$

2) $a = b$

3) $b = \text{sum}$

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;
```

$$a^b = ?$$

```
int power = 1;
```

```
cin >> a >> b;
```

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

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

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

Thank
You

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