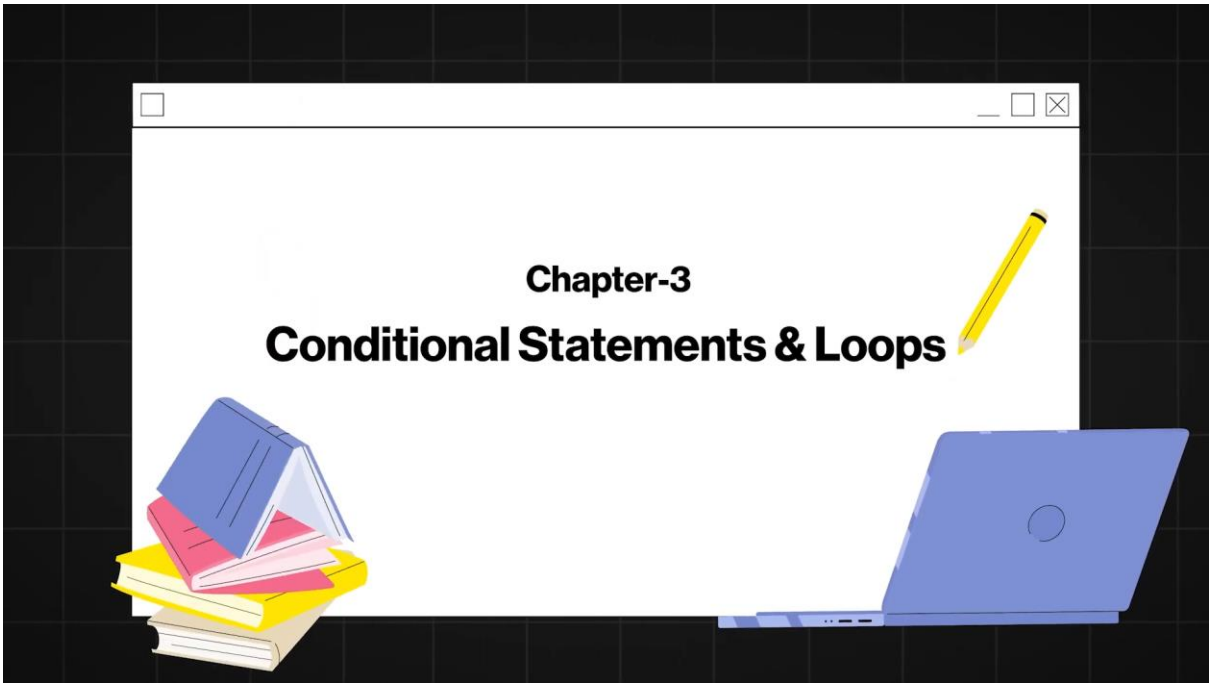
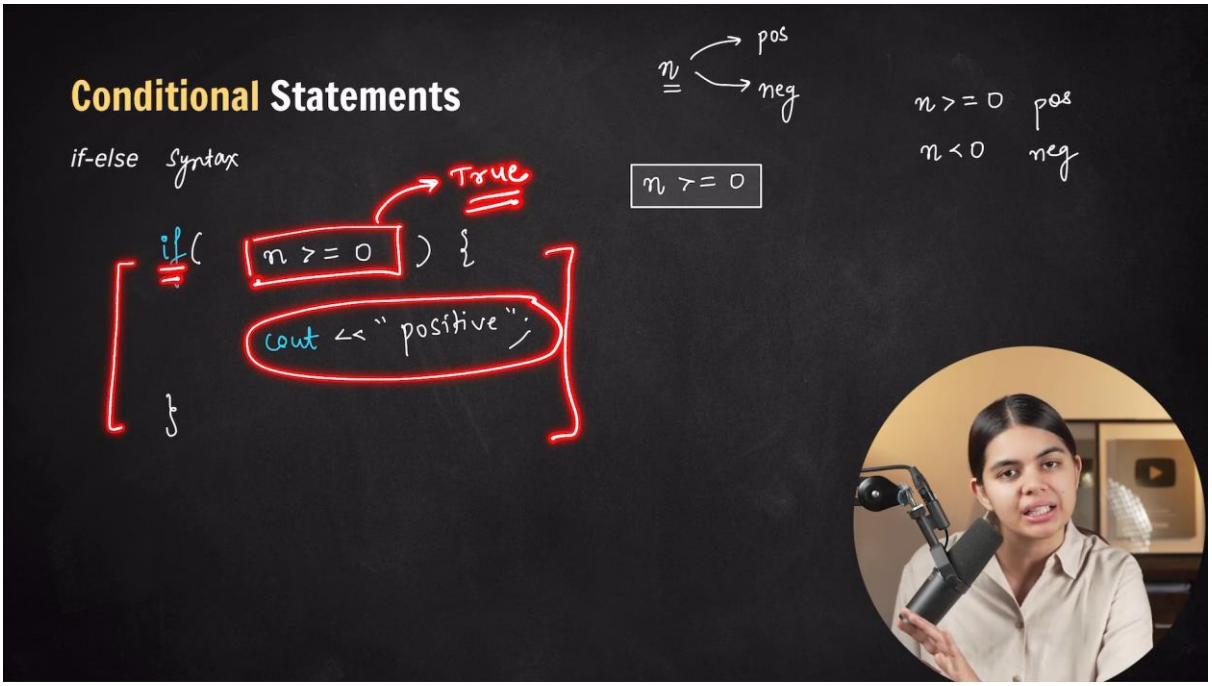
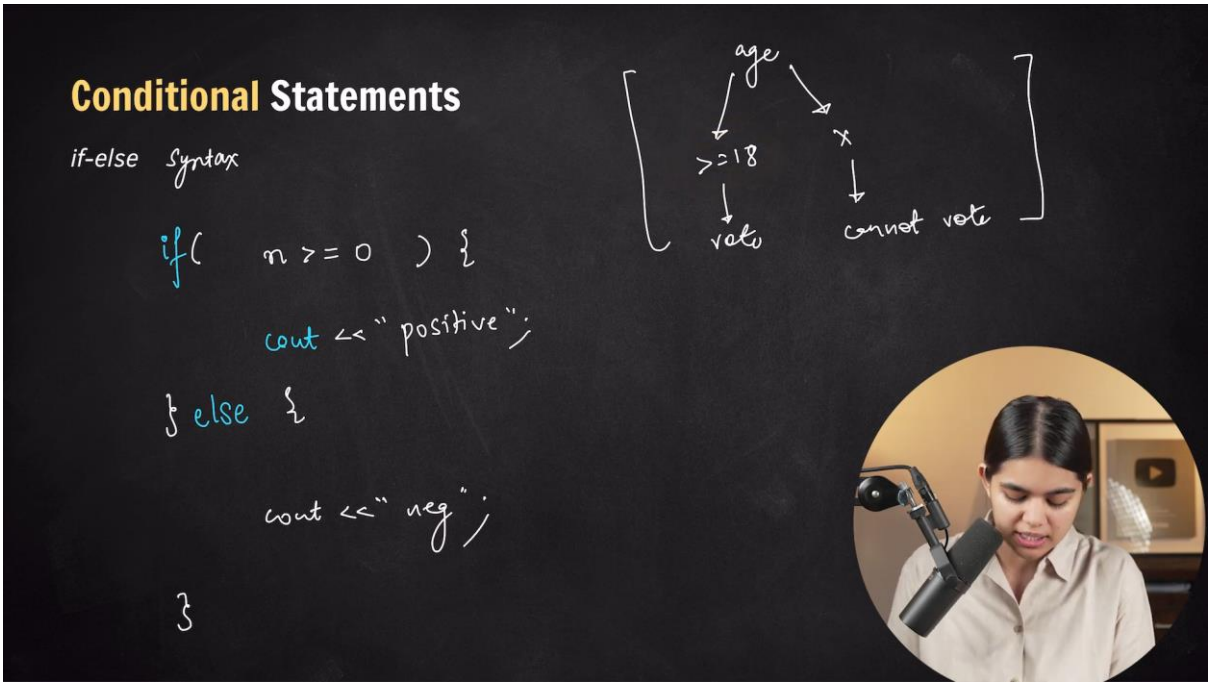

Chapter-3
Conditional Statements & Loops


Conditional Statements
if-else Syntax
if(n >= 0) {
cout << " positive ";
}
True
n
pos
neg
n >= 0
n >= 0 pos
n < 0 neg


Conditional Statements
if-else Syntax
if(n >= 0) {
cout << " positive ";
} else {
cout << " neg ";
}
age
>=18
x
vote
cannot vote

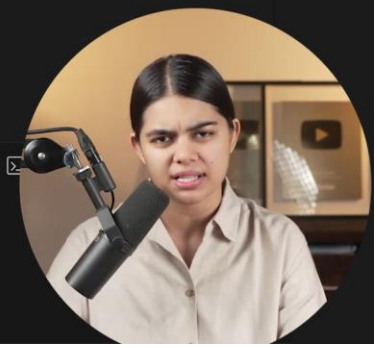
YTSeries

code.cpp

```cpp
#include <iostream>
using namespace std;

int main() {
    int n = -5;

    if(n >= 0) {
        cout << "n is positive\n";
    } else {
        cout << "n is negative\n";
    }

    return 0;
}
```

PORTS PROBLEMS DEBUG CONSOLE OUTPUT TERMINAL

```
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
n is negative
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
n is positive
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
n is negative
apnacollege@Shradha YTSeries %
```



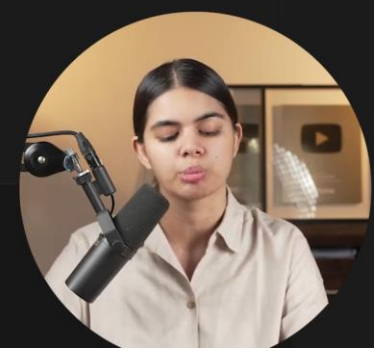
YTSeries

code.cpp

```cpp
#include <iostream>
using namespace std;

int main() {
    int age;
    cout << "enter age : ";
    cin >> age;

    if(age >= 18) {
        cout << "you can vote\n";
    } else {
        cout << "you can't vote\n";
    }

    return 0;
}
```

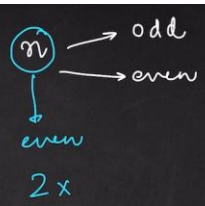
PORTS PROBLEMS DEBUG CONSOLE OUTPUT TERMINAL

```
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
enter age : 25
you can vote
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
enter age : 17
you can't vote
apnacollege@Shradha YTSeries %
```



Conditional Statements

if-else Syntax




```
if (n%2 == 0) {
    cout<<"Even";
} else {
    cout<<"Odd";
}
```

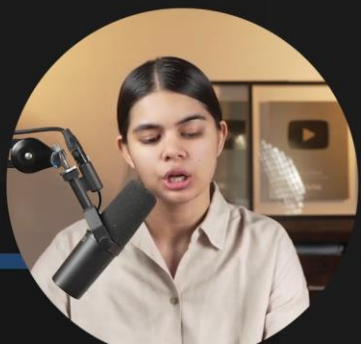
YTSeries

code.cpp

```cpp
#include <iostream>
using namespace std;

int main() {
    int n;
    cout << "enter number : ";
    cin >> n;

    if(n%2 == 0) {
        cout << "even\n";
        cout << "bye\n";
    } else {
        cout << "odd\n";
    }

    return 0;
}
```

PORTS PROBLEMS DEBUG CONSOLE OUTPUT TERMINAL

```
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
enter number : 30
even
bye
apnacollege@Shradha YTSeries %
```



Conditional Statements

if- else if - else

marks >= 90 → A

80-90 → B

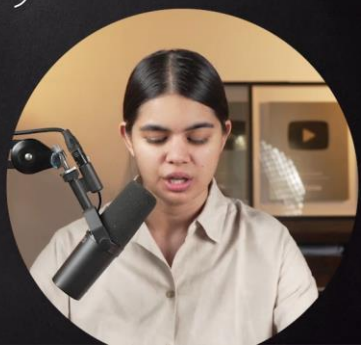
< 80 → C

80 - 90

marks >= 80

marks < 90

```
if( marks >= 90) {
    cout << "A";
} else if ( marks >= 80 && marks < 90) {
    cout << "B";
} else {
    cout << "C";
}
```



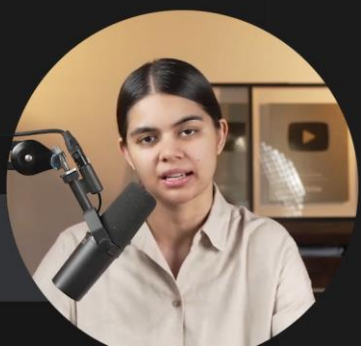
YTSeries

code.cpp

```cpp
#include <iostream>
using namespace std;

int main() {
    int marks;
    cout << "enter marks : ";
    cin >> marks;

    if(marks >= 90) {
        cout << "A\n";
    } else if(marks >= 80 && marks < 90) {
        cout << "B\n";
    }else {
        cout << "C\n";
    }

    return 0;
}
```

PORTS PROBLEMS DEBUG CONSOLE OUTPUT TERMINAL

```
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
enter marks : 95
A
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
enter marks : 82
B
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
enter marks : 75
C
apnacollege@Shradha YTSeries %
```



Qs

Find character lowercase or uppercase

1

`a' =< ch <= `z'

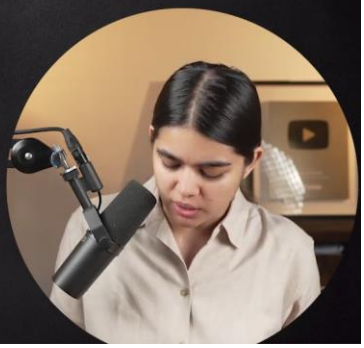
if (ch >= `a' && ch <= `z')
↳ lowercase

else
↳ uppercase

`a'
↓
lowercase
`a' - `z'

`A'
↓
uppercase
`A' - `Z'

ch >= `A' && ch <= `Z'



Qs

Find character lowercase or uppercase

ASCII
char ⟶ numbers

1

a ⟶ 97
b ⟶ 98

A ⟶ 65
B ⟶ 66

[A-Z]
(65-90)

if(ch >= 65 && ch <= 90)
`A' `Z'
↳ uppercase

else
↳ lowercase

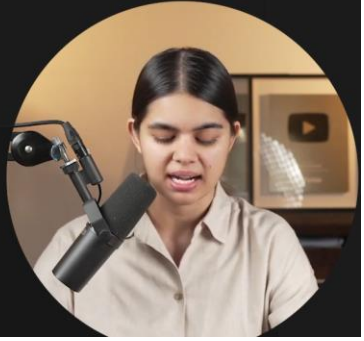
YTSeries

code.cpp

```cpp
#include <iostream>
using namespace std;

int main() {
    char ch;
    cout << "enter char : ";
    cin >> ch;

    if(ch >= 65 && ch <= 90) {
        cout << "uppercase\n";
    } else {
        cout << "lowercase\n";
    }

    return 0;
}
```

PORTS PROBLEMS DEBUG CONSOLE OUTPUT TERMINAL

```
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
enter char : b
lowercase
apnacollege@Shradha YTSeries %
```



Qs

Find character lowercase or uppercase

1

a → 97 b → 98 A → 65 B → 66

'A' 'Z'

if (ch >= 65 && ch <= 90)

→ uppercase

else → lowercase

ch = M

M >= 65

implicit conversion type

Ternary Statement

condition ? stt1 : strr2 ;

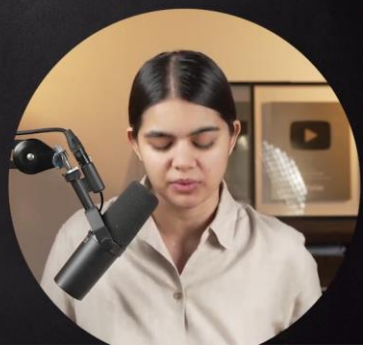
True False

n >= 0 ? "pos" : "neg" ;

if (cond") {

} else {

}



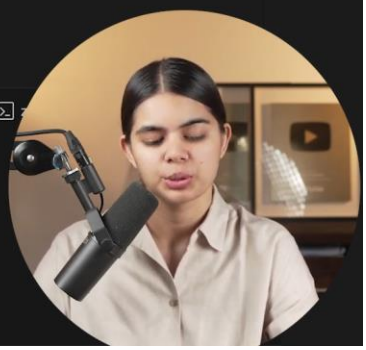
YTSeries

code.cpp

```cpp
#include <iostream>
using namespace std;

int main() {
    int n = -45;

    cout << (n >= 0 ? "positive" : "negative") << endl;
    return 0;
}
```

PORTS PROBLEMS DEBUG CONSOLE OUTPUT TERMINAL

```
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
positive
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
negative
apnacollege@Shradha YTSeries %
```



Loops

while loop

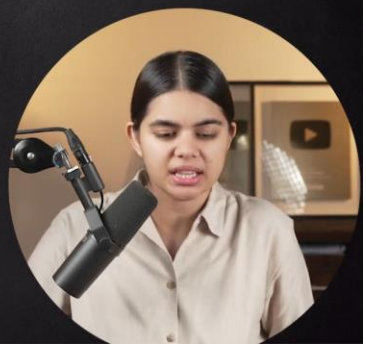
Qs : Print numbers 1 to 5

```
int count = 1

while (count <= 5 ) {
    cout << count ;
    count++;
}
```

1 2 3 4 5

count = ~~1~~ ~~2~~ 3

1 2 3



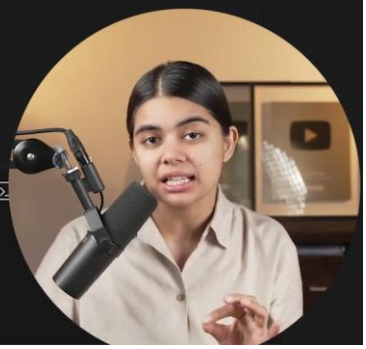
YTSeries

code.cpp

```cpp
#include <iostream>
using namespace std;

int main() {
    int count = 1;

    while(count <= 10) {
        cout << count << " ";
        count++;
    }

    cout << endl;
    return 0;
}
```

PORTS PROBLEMS DEBUG CONSOLE OUTPUT TERMINAL

```
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
1 2 3 4 5
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
1 2 3 4 5 6 7 8 9 10
apnacollege@Shradha YTSeries %
```



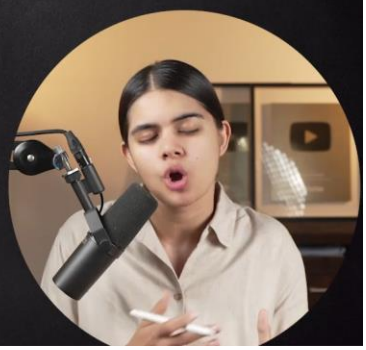
Loops

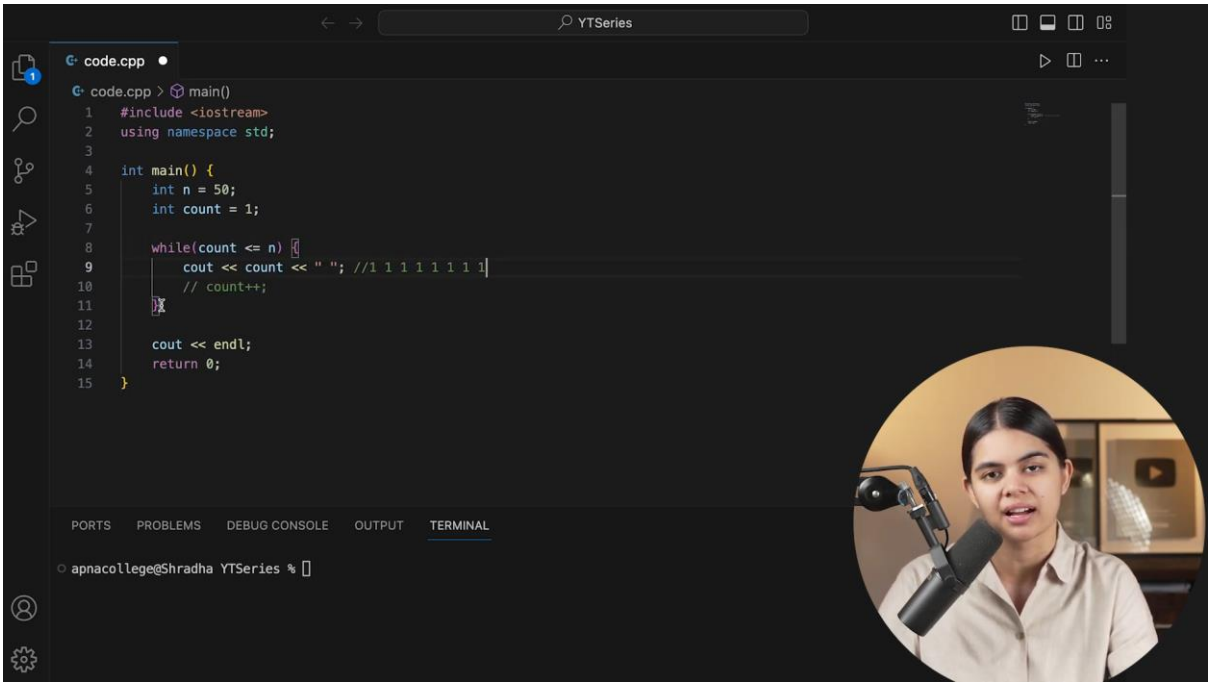
while loop

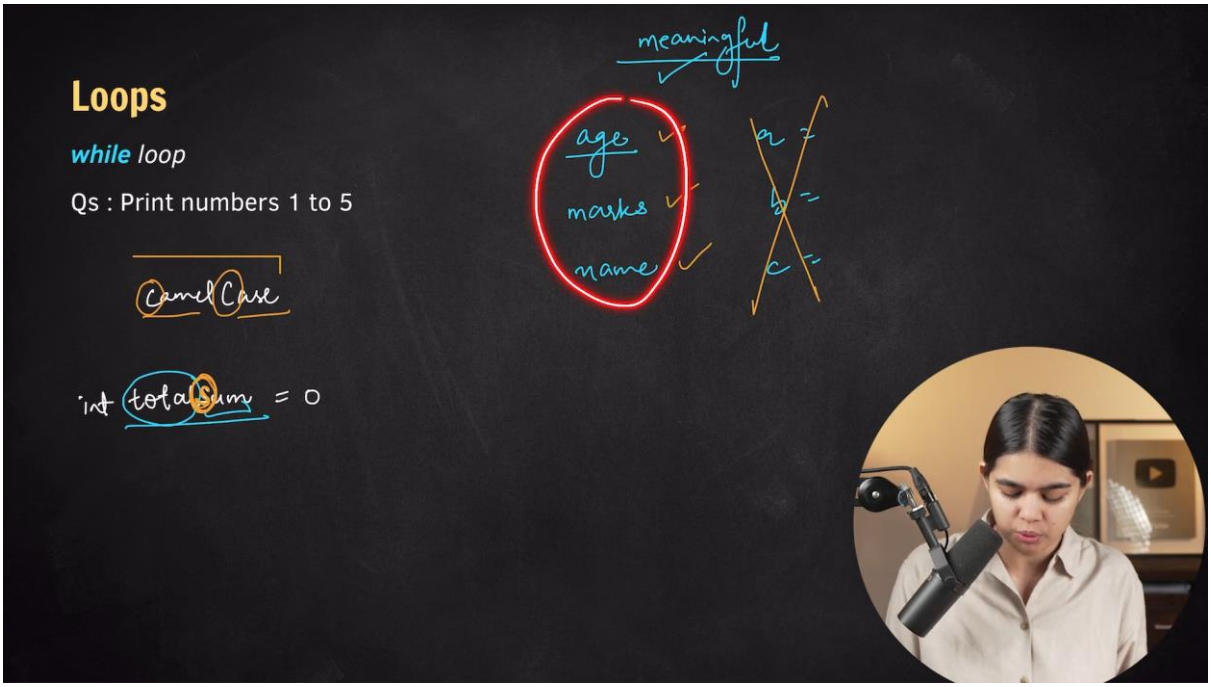
Qs : Print numbers 1 to 5

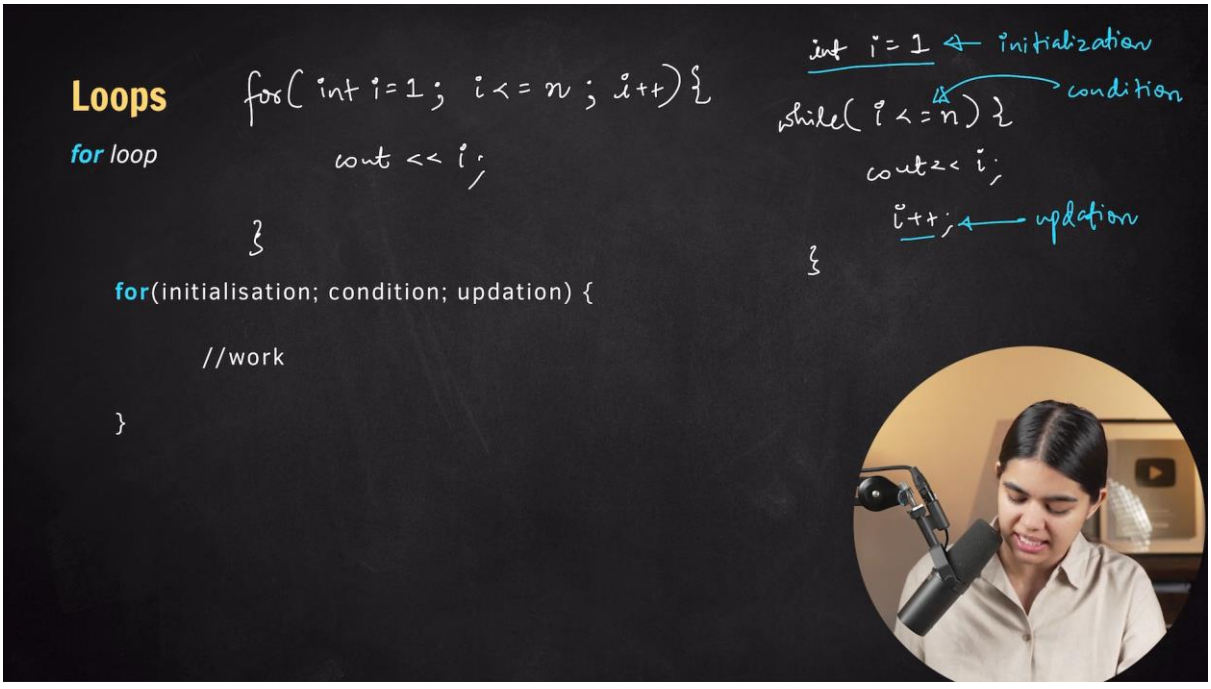
Infinite loop

ending cond^n




YTSeries
code.cpp
code.cpp > main()
#include <iostream>
using namespace std;
int main() {
int n = 50;
int count = 1;
while(count <= n) {
cout << count << " "; //1 1 1 1 1 1 1 1
// count++;
}
cout << endl;
return 0;
}
PORTS
PROBLEMS
DEBUG CONSOLE
OUTPUT
TERMINAL
apnacollege@Shradha YTSeries %


Loops
while loop
Qs : Print numbers 1 to 5
meaningful
age
marks
name
camelCase
int totalSum = 0


Loops
for loop
for(int i=1; i<=n; i++){
cout << i;
}
for(initialisation; condition; updation) {
//work
}
int i = 1 ← initialization
while(i <= n) { ← condition
cout<< i;
i++; ← updation
}

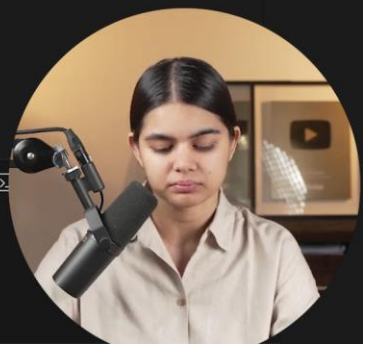
YTSeries

code.cpp

```cpp
#include <iostream>
using namespace std;

int main() {
    int n = 10;

    for(int i=1; i<=n; i+2) {
        cout << i << " ";
    }

    cout << endl;
    return 0;
}
```

PORTS PROBLEMS DEBUG CONSOLE OUTPUT TERMINAL

```
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
1 2 3
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
1 2 3 4 5 6 7 8 9 10
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out;2A
```



Qs

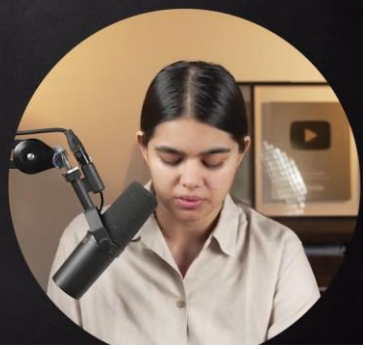
Sum of numbers from 1 to n.

n = 3

i = ~~1~~ ~~2~~ ~~3~~ 4

Sum = 0 + 1 + 2 + 3 = 6

```cpp
for( int i=1; i<=n; i+1 ) {
    sum += i ;
}
cout << sum; 116
```



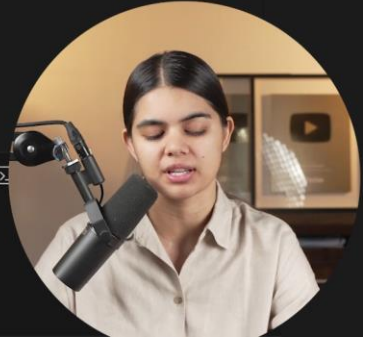
YTSeries

code.cpp

```cpp
#include <iostream>
using namespace std;

int main() {
    int n = 10;
    int sum = 0;

    for(int i=1; i<=n; i++) {
        sum += i;
    }

    cout << "sum = " << sum << endl;
    return 0;
}
```

PORTS PROBLEMS DEBUG CONSOLE OUTPUT TERMINAL

```
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
sum = 6
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
sum = 15
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
sum = 55
apnacollege@Shradha YTSeries %
```



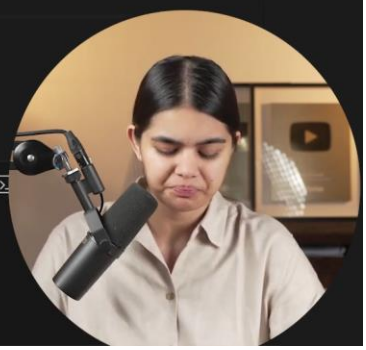
YTSeries

code.cpp

```cpp
using namespace std;

int main() {
    int n = 50;
    int sum = 0;

    for(int i=1; i<=n; i++) { // 1 + 2 + 3 + 4 + 5 => 15
        sum += i;
        if(i == 5) {
            break; //keyword
        }
    }

    cout << "sum = " << sum << endl;
    return 0;
}
```

PORTS PROBLEMS DEBUG CONSOLE OUTPUT TERMINAL

```
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
sum = 15
apnacollege@Shradha YTSeries %
```

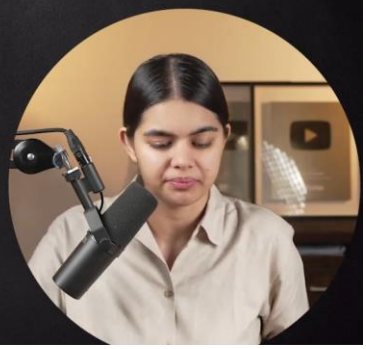


Qs

Sum of all Odd numbers from 1 to N

n%2 != 0 → odd

```
for(int i=1; i<=n; i++) {
    if (i%2 != 0) → odd
}
}
```



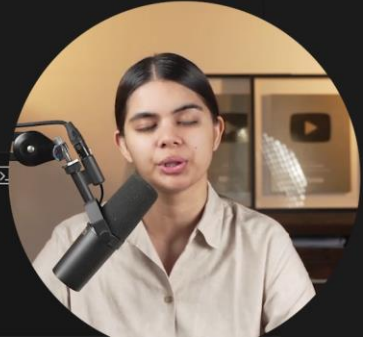
YTSeries

code.cpp

```cpp
using namespace std;

int main() {
    int n = 50;

    //print odd numbers
    for(int i=1; i<=n; i++) {
        if(i%2 != 0) {
            cout << i << " ";
        }
    }

    cout << endl;
    return 0;
}
```

PORTS PROBLEMS DEBUG CONSOLE OUTPUT TERMINAL

```
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
1 3 5
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
1 3 5 7 9
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
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
apnacollege@Shradha YTSeries %
```



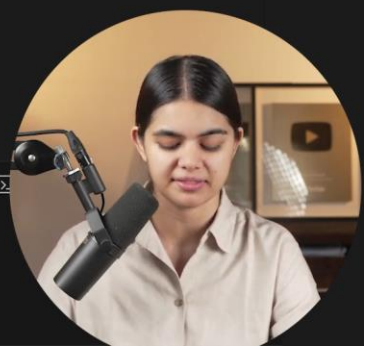
YTSeries

code.cpp

```cpp
using namespace std;

int main() {
    int n = 10;
    int oddSum = 0;

    for(int i=1; i<=n; i++) {
        if(i%2 != 0) {
            oddSum += i;
        }
    }

    cout << "odd sum = " << oddSum << endl;
    return 0;
}
```

PORTS PROBLEMS DEBUG CONSOLE OUTPUT TERMINAL

```
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
odd sum = 9
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
odd sum = 25
apnacollege@Shradha YTSeries %
```



Loops

***do while** loop*

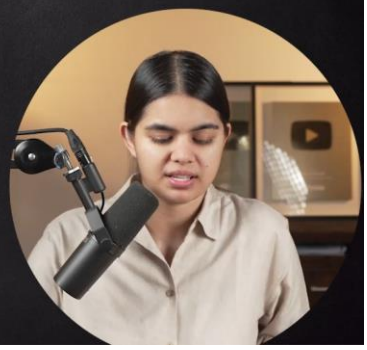
do {

} while(condⁿ);

while (condⁿ) {

F

}



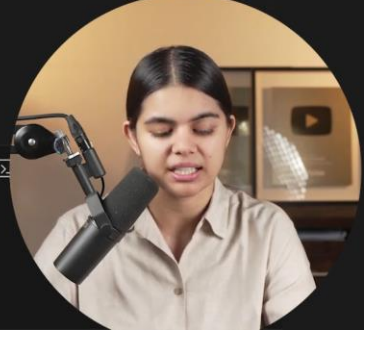
YTSeries

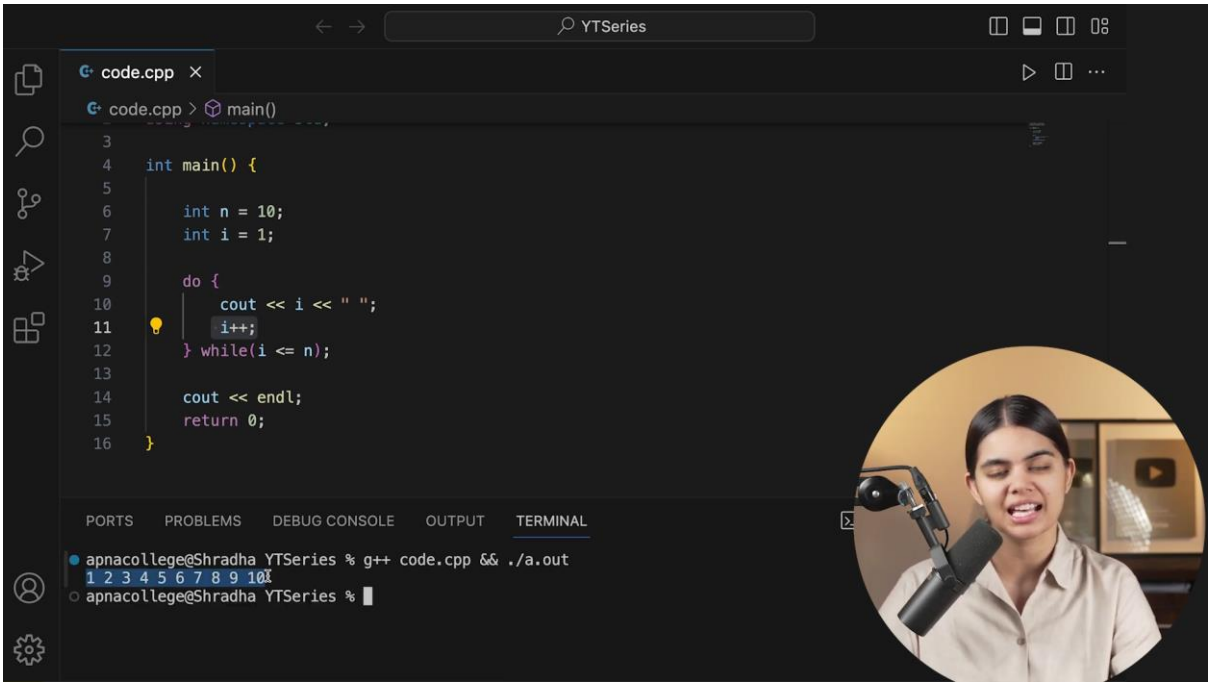
code.cpp

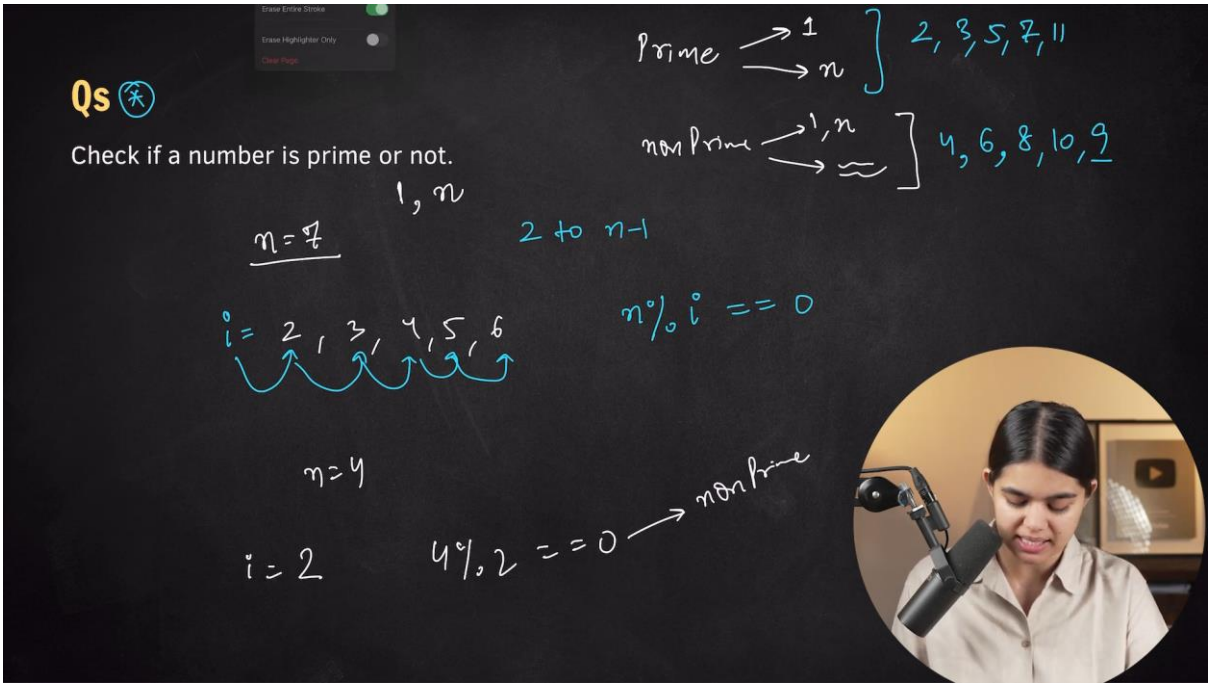
```cpp
int main() {

    // while(3 > 5) {
    //     cout << "hello world!\n";
    // }

    do {
        cout << "hello world!\n";
    } while(3 > 5);

    return 0;
}
```

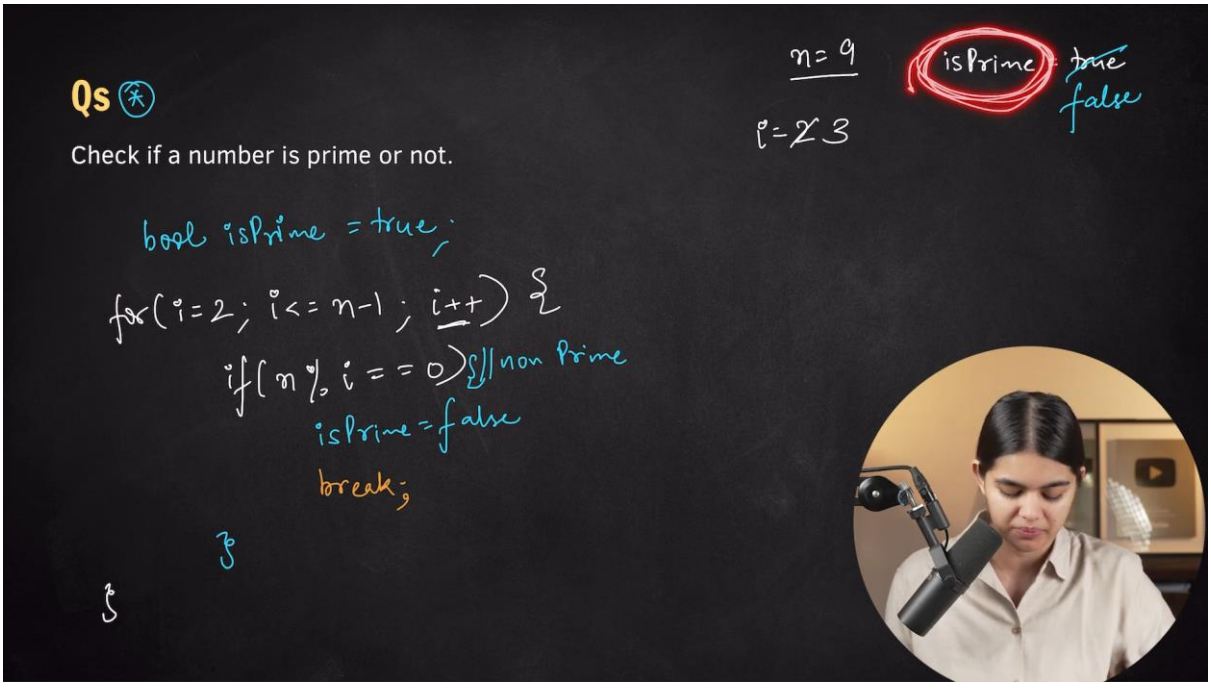
PORTS PROBLEMS DEBUG CONSOLE OUTPUT TERMINAL

```
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
hello world!
apnacollege@Shradha YTSeries %
```




YTSeries
code.cpp
code.cpp > main()
int main() {
int n = 10;
int i = 1;
do {
cout << i << " ";
i++;
} while(i <= n);
cout << endl;
return 0;
}
PORTS PROBLEMS DEBUG CONSOLE OUTPUT TERMINAL
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
1 2 3 4 5 6 7 8 9 10
apnacollege@Shradha YTSeries %


Qs
Check if a number is prime or not.
Prime → 1, n → 2, 3, 5, 7, 11
nonPrime → 1, n → 4, 6, 8, 10, 9
1, n
n = 7
2 to n-1
i = 2, 3, 4, 5, 6
n % i == 0
n = 4
i = 2
4 % 2 == 0 → nonPrime


Qs
Check if a number is prime or not.
n = 9
isPrime : true false
i = 2 3
bool isPrime = true;
for(i=2; i<=n-1; i++) {
if(n % i == 0) // non Prime
isPrime = false
break;
}
}

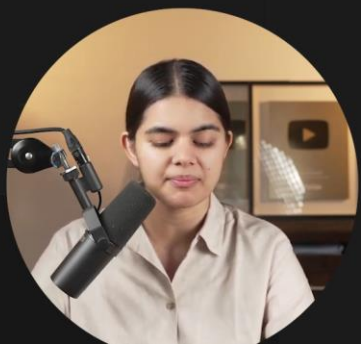
YTSeries

code.cpp

```cpp
#include <iostream>
using namespace std;

int main() {
    int n = 7;
    bool isPrime = true;

    for(int i=2; i<=n-1; i++) {
        if(n % i == 0) { //non prime
            isPrime = false;
            break;
        }
    }

    if(isPrime == true) {
        cout << "prime no\n";
    } else {
        cout << "non prime no\n";
    }
    return 0;
}
```

PORTS PROBLEMS DEBUG CONSOLE OUTPUT TERMINAL

```
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
prime no
apnacollege@Shradha YTSeries %
```



Qs

Check if a number is prime or not.

i*i <= n

2 to (n-1) X

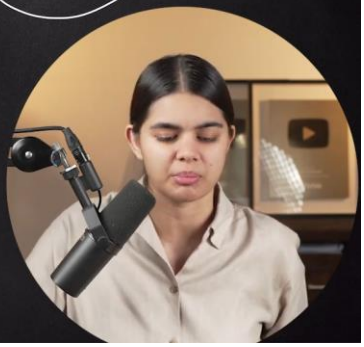
2 to √n

i*i <= n

√n * √n

n

```
bool isPrime = true;
for(i=2; i<=n-1; i++) {
    if(n % i == 0) // non Prime
        isPrime = false
        break;
}
}
```



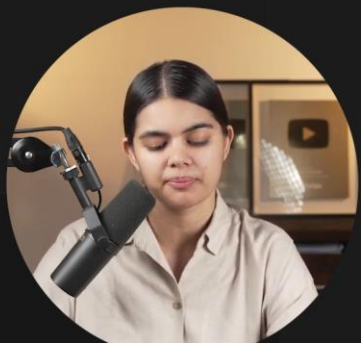
YTSeries

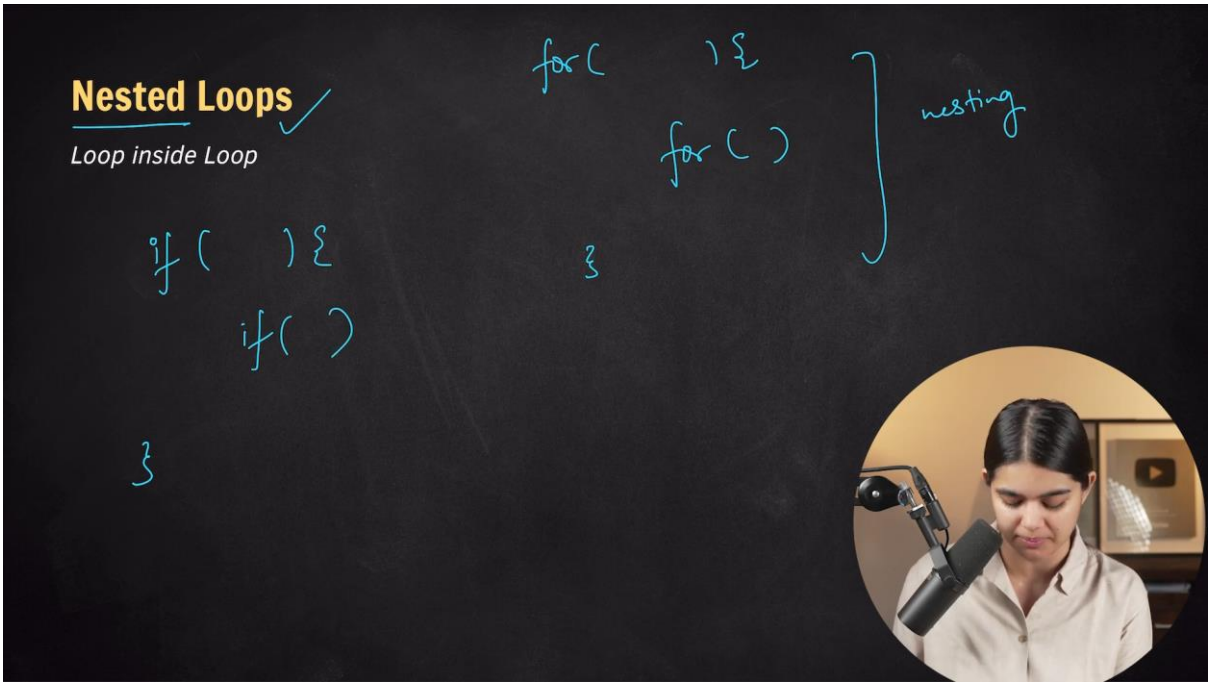
code.cpp

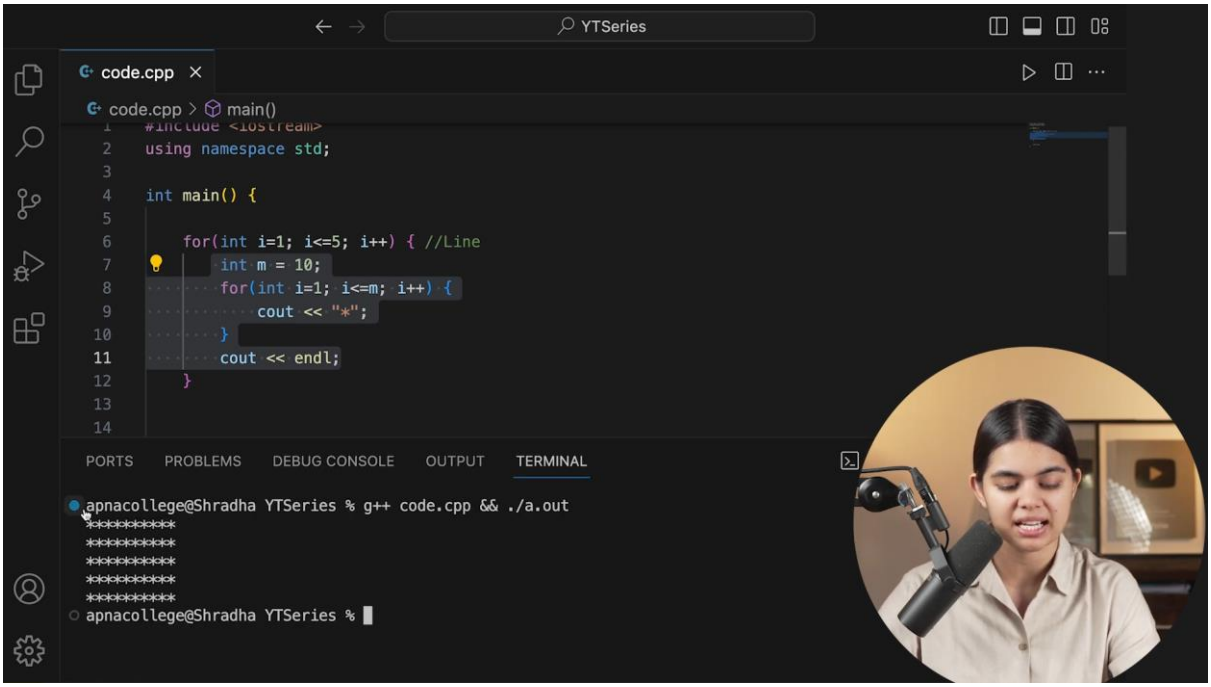
```cpp
#include <iostream>
using namespace std;

int main() {
    int n = 11;
    bool isPrime = true;

    for(int i=2; i*i <= n; i++) {
        if(n % i == 0) { //non prime
            isPrime = false;
            break;
        }
    }

    if(isPrime == true) {
        cout << "prime no\n";
    } else {
        cout << "non prime no\n";
    }
    return 0;
}
```

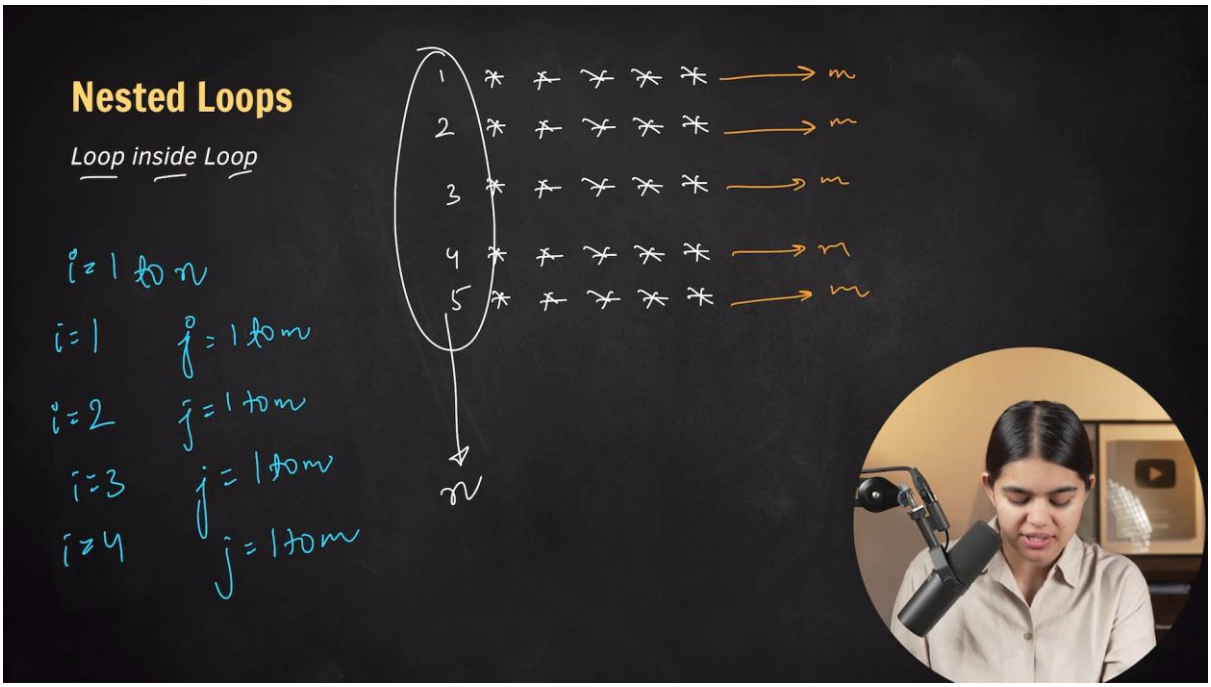
PORTS PROBLEMS DEBUG CONSOLE OUTPUT TERMINAL

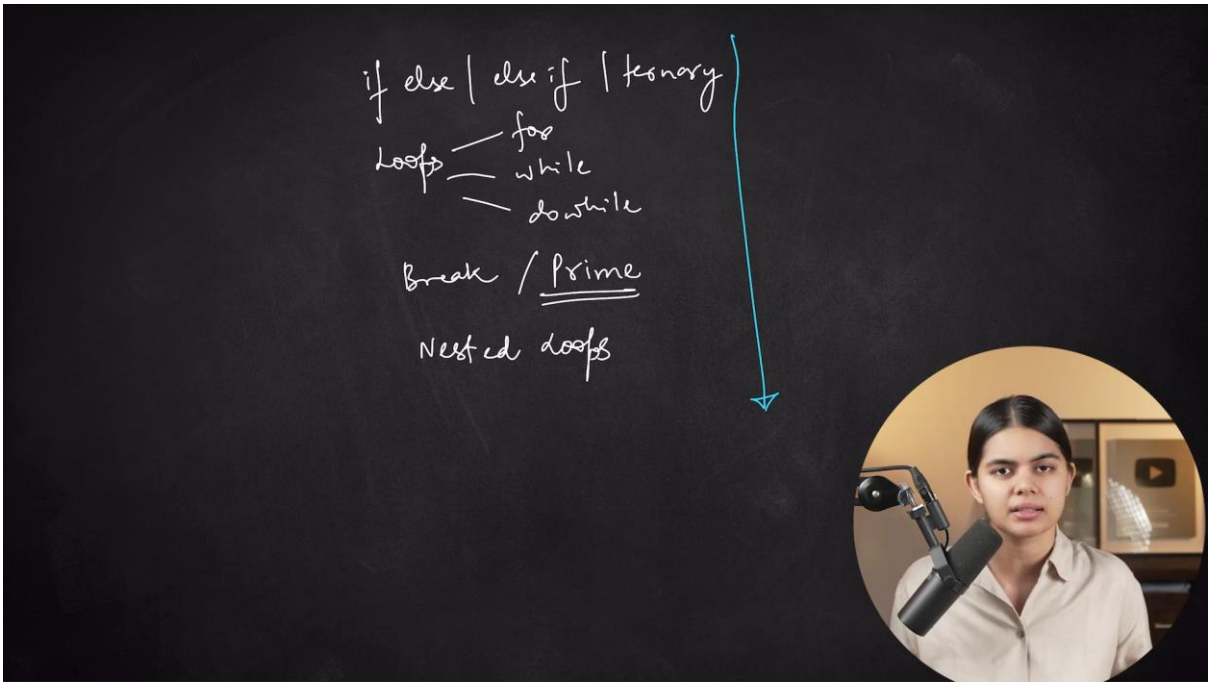
```
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
non prime no
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
non prime no
apnacollege@Shradha YTSeries % clear
```

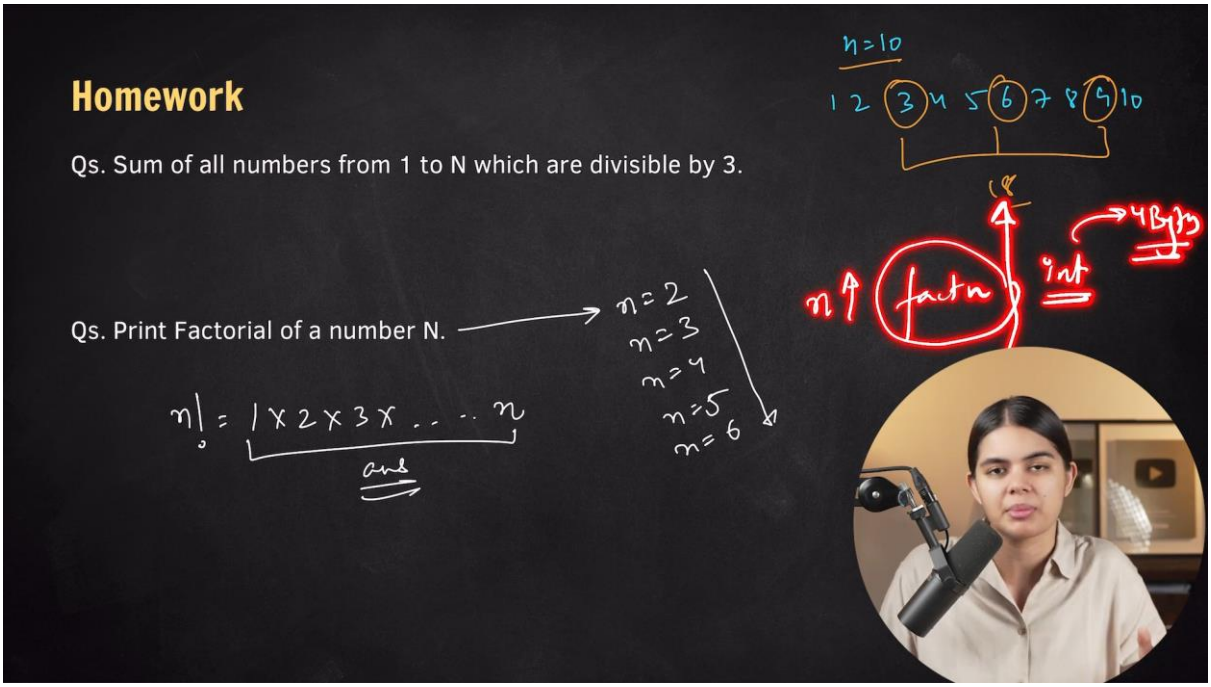



Nested Loops
Loop inside Loop
for( ){
for( )
nesting
if( ){
if( )
}
}


YTSeries
code.cpp
code.cpp > main()
#include <iostream>
using namespace std;
int main() {
for(int i=1; i<=5; i++) { //Line
int m = 10;
for(int i=1; i<=m; i++) {
cout << "*";
}
cout << endl;
}
PORTS
PROBLEMS
DEBUG CONSOLE
OUTPUT
TERMINAL
apnacollege@Shradha YTSeries % g++ code.cpp && ./a.out
****
****
****
****
****
apnacollege@Shradha YTSeries %


Nested Loops
Loop inside Loop
i=1 to n
i=1 j=1 to m
i=2 j=1 to m
i=3 j=1 to m
i=4 j=1 to m
1
2
3
4
5
m
n


if else | else if | ternary
Loops — for
— while
— do while
Break / Prime
Nested loops


Homework
Qs. Sum of all numbers from 1 to N which are divisible by 3.
Qs. Print Factorial of a number N.
n! = 1 x 2 x 3 x .... n
and
n=2
n=3
n=4
n=5
n=6
n=10
1 2 3 4 5 6 7 8 9 10
n
fact n
int
4 Bytes

Homework Solution:

```
// Qs. Sum of all numbers from 1 to N which are divisible by 3.
#include <iostream>
using namespace std;

int main() {
   int n = 10, sum = 0;

   for(int i=1; i<=n; i++) {
      if(i%3 == 0){
         sum += i;
      }
   }

   cout << "Sum of numbers which are divisible by 3 = " << sum << endl;

   return 0;
}

// Qs. Print Factorial of a number N.
#include <iostream>
using namespace std;

int main() {
   int n = 5, fact = 1;

   for(int i=1; i<=n; i++) {
      fact *= i;
   }

   cout << "Factorial = " << fact << endl;

   return 0;
}
```