If - Else statements

The fundamental control structure

If statement:

Only evaluated if condition is true

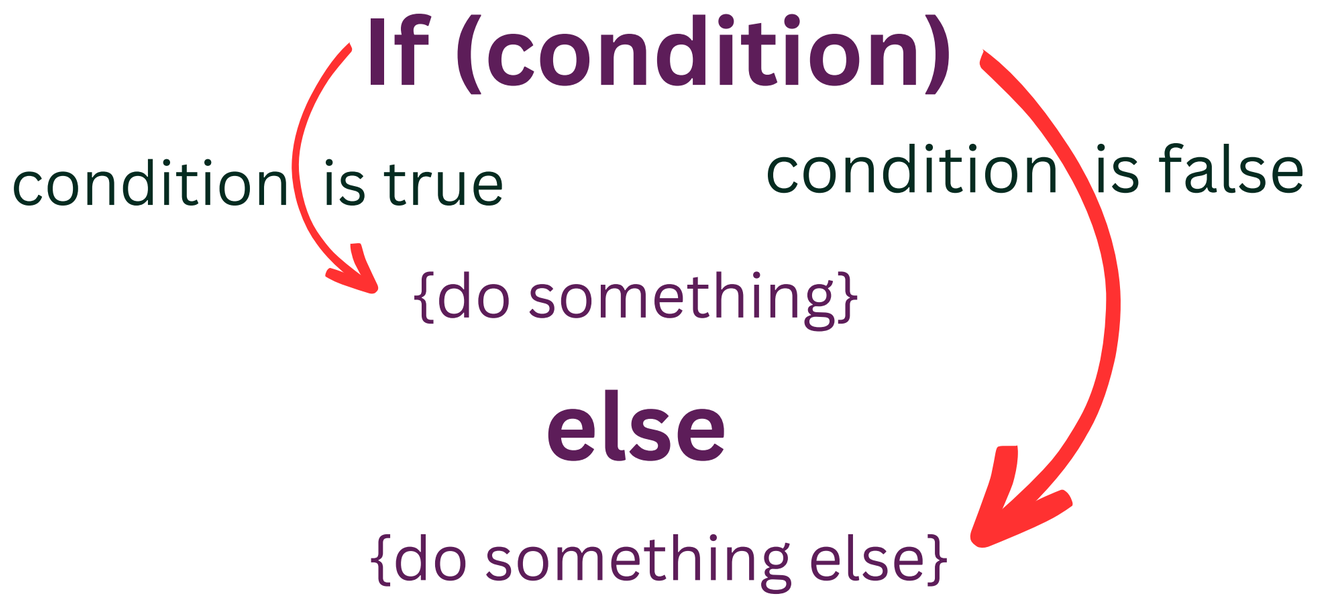
```
int main() {
    int a = 0;
    if (a % 2 == 0){
        cout << "the integer is even\n";
    }
}
```

```
int main() {
    int a = 3;
    if (a % 2 == 0){
        cout << "the integer is even\n";
    }
}
```

Else statement:

Complementing if

Only evaluated if the condition fails




```cpp
int main() {
    int a = 3;
    if (a % 2 == 0) {
        cout << "the integer is even\n";
    } else {
        cout << "the integer is odd\n";
    }
}
```

What is the output?

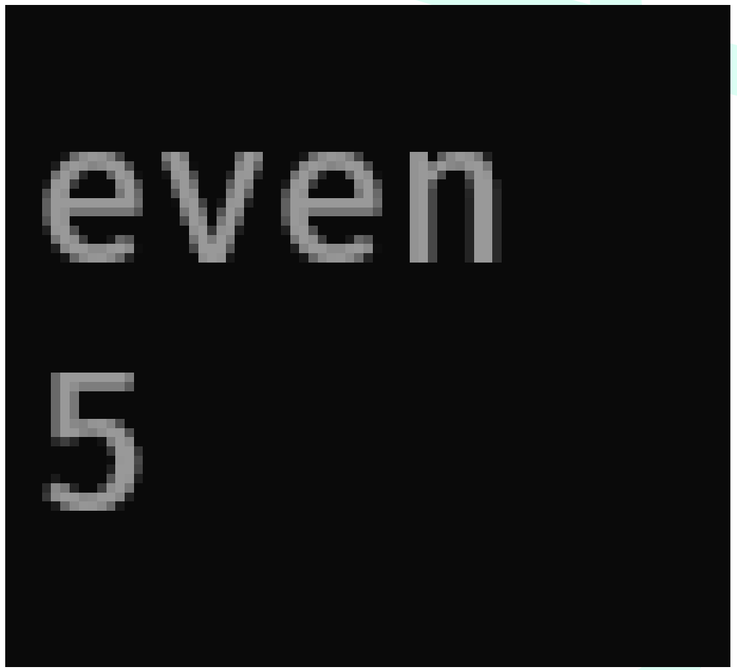
```
int main ()
{
    int a = 4;
    if (a % 2 == 0) {
        cout << "even\n";
        a = a + 1;
    } else {
        cout << "odd\n";
        a = a + 2;
    }
    cout << a << '\n';
}
```

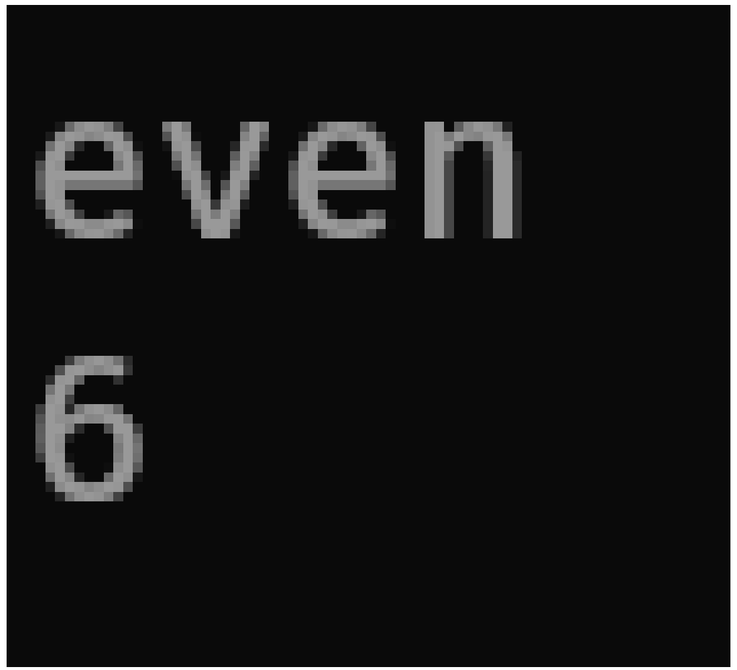
```
int main ()
{
    int a = 4;
    if (a % 2 == 0) {
        cout << "even\n";
        a = a + 1;
    }
    if (a % 2 == 1) {
        cout << "odd\n";
        a = a + 2;
    }
    cout << a << '\n';
}
```

```
int main ()
{
    int a = 4;
    if (a % 2 == 0) {
        cout << "even\n";
        a = a + 2;
    }
    if (a % 2 == 1) {
        cout << "odd\n";
        a = a + 2;
    }
    cout << a << '\n';
}
```

Hint: Think about the sequence in which the code executes

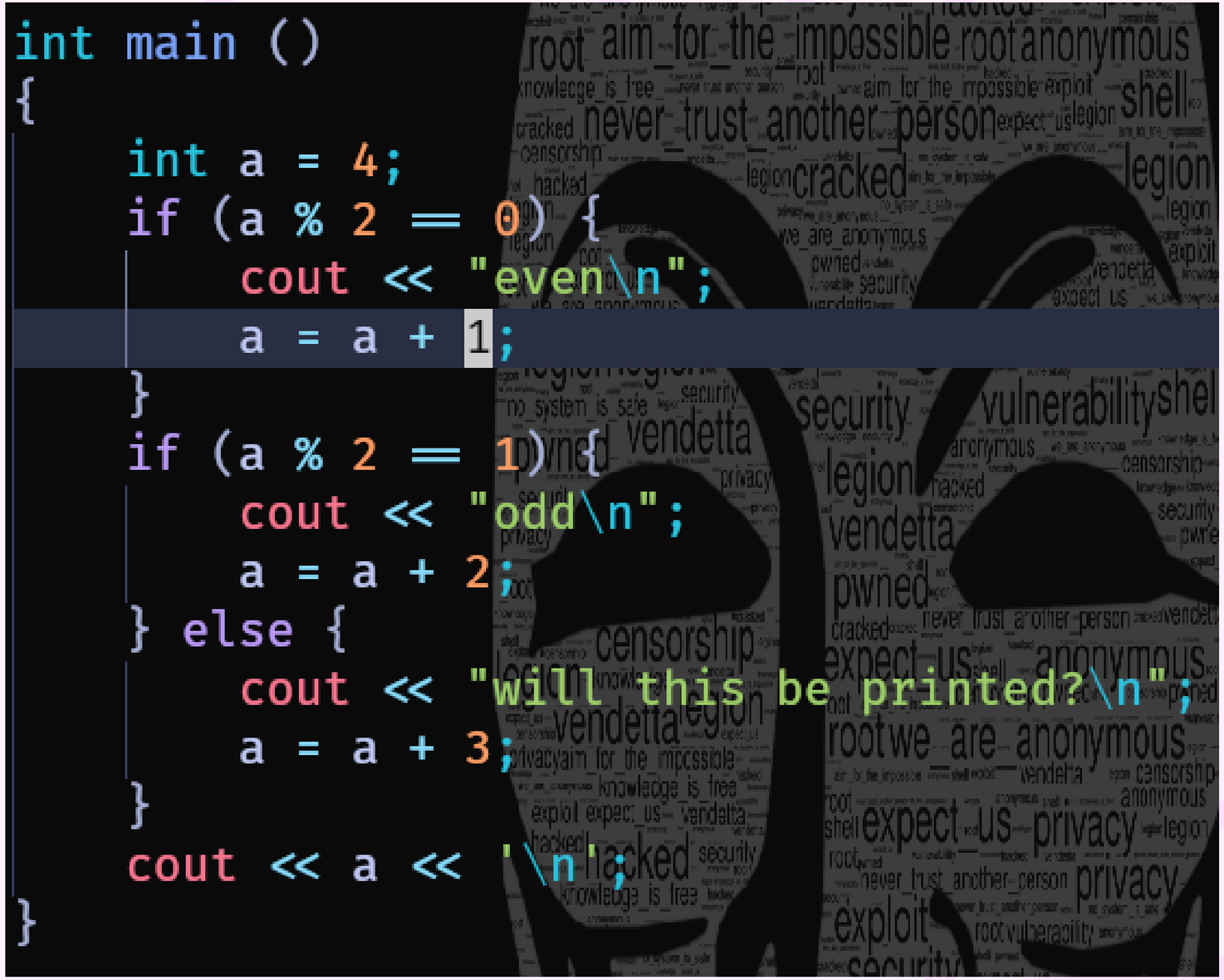
The Outputs





Dangling Else statement

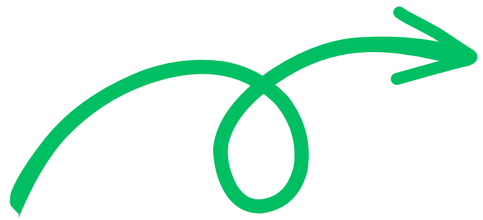
Which if do you think it belongs to?



Nested If Else

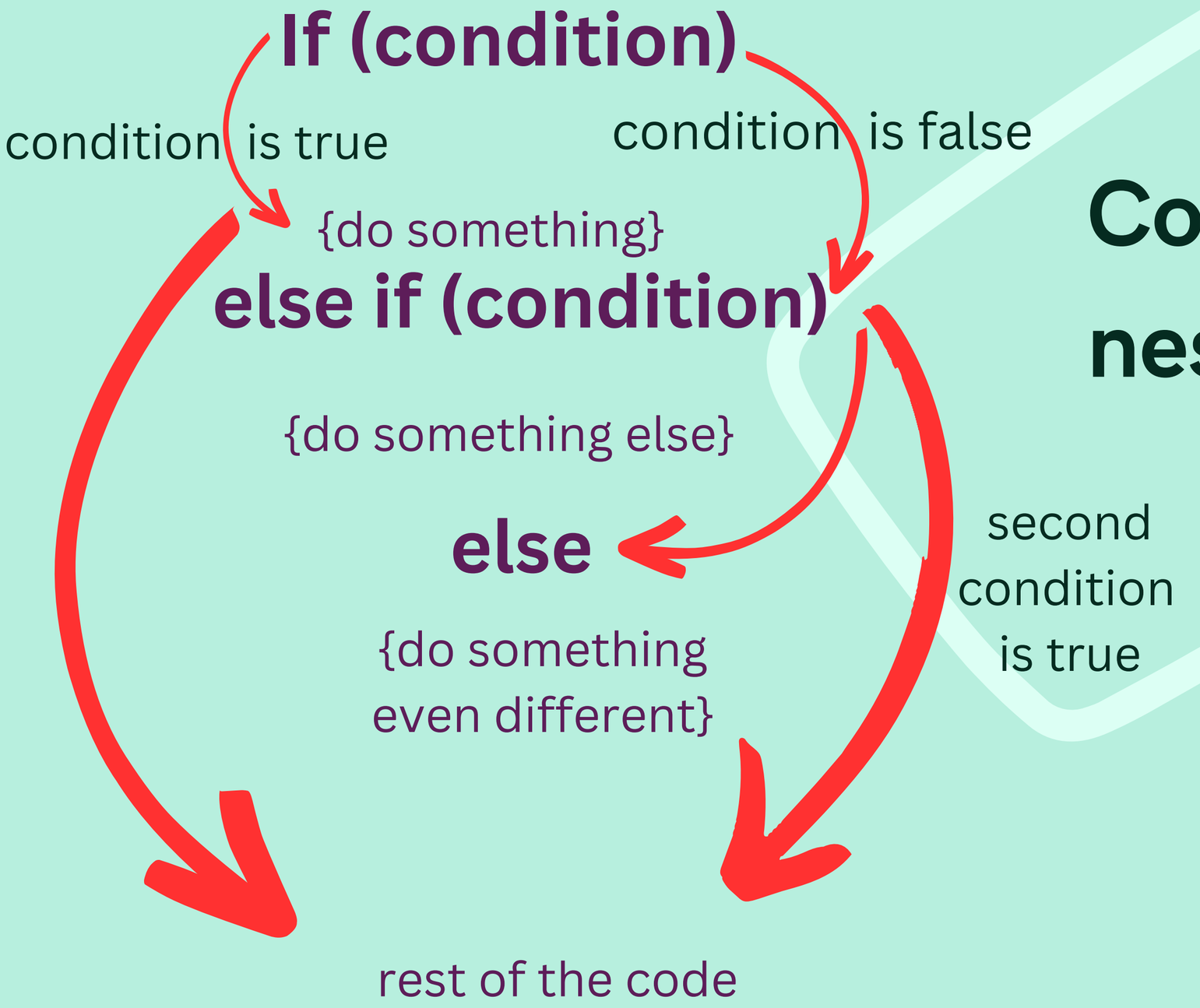
Sequential Code Evaluation

```
int main ()
{
    int a = 4;
    if (a == 2) {
        cout << "two\n";
    } else {
        if (a == 3){
            cout <<"three\n";
        } else {
            if (a == 4) {
                cout <<"four\n";
            }
        }
    }
}
```



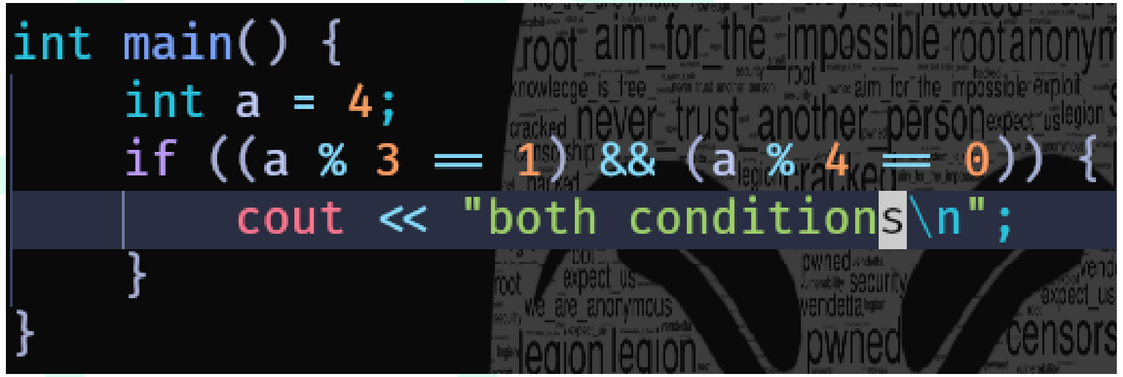
```
int main() {
    int a = 4;
    if (a == 2) {
        cout << "two\n";
    } else if (a == 3) {
        cout << "three\n";
    } else if (a == 4) {
        cout << "four\n";
    }
}
```

Control Flow in a nested if else



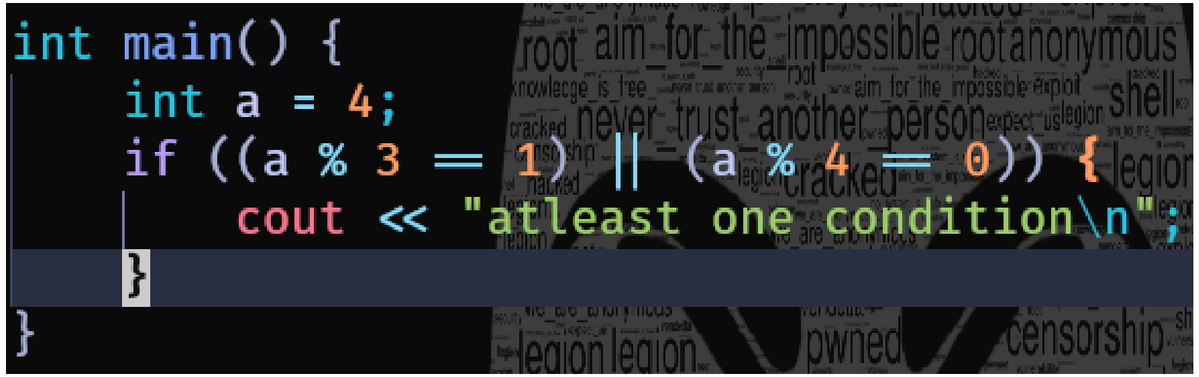
Logical Operators

Logical And (&&)



```
int main() {
    int a = 4;
    if ((a % 3 == 1) && (a % 4 == 0)) {
        cout << "both conditions\n";
    }
}
```

Logical Or (||)



```
int main() {
    int a = 4;
    if ((a % 3 == 1) || (a % 4 == 0)) {
        cout << "atleast one condition\n";
    }
}
```

Loops

Repitition at its finest

Short Circuiting

Logical And

(Condition 1): false
(Condition 2): Not evaluated

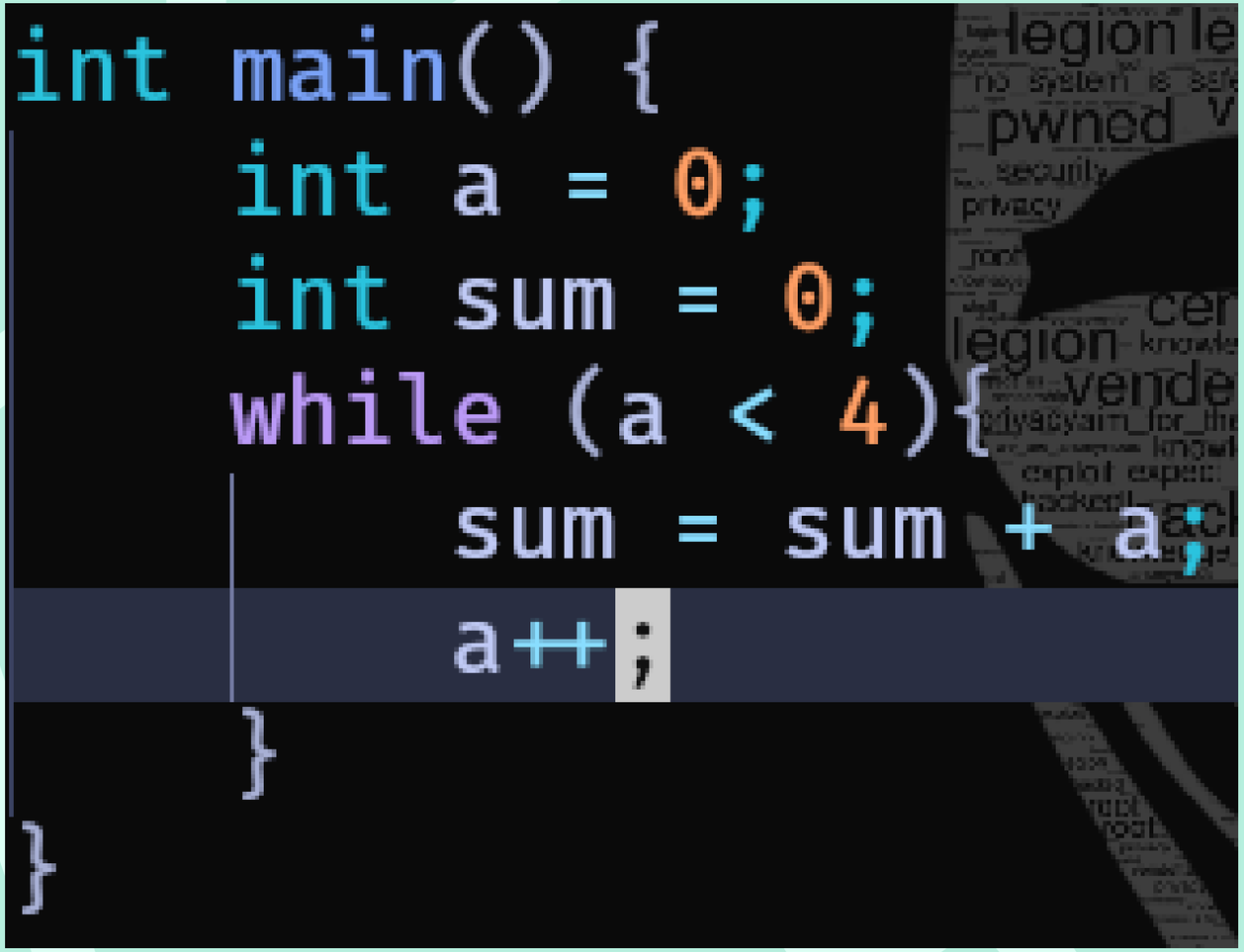
Logical Or

(Condition 1): true
(Condition 2): Not evaluated

Calculate the number of digits in the number

```cpp
int main() {
    int a = 12345678;
    int digits = 0;
    while ( a > 0 ){
        a = a/10;
        digits = digits + 1;
    }
    cout << digits << '\n';
}
```

While loop



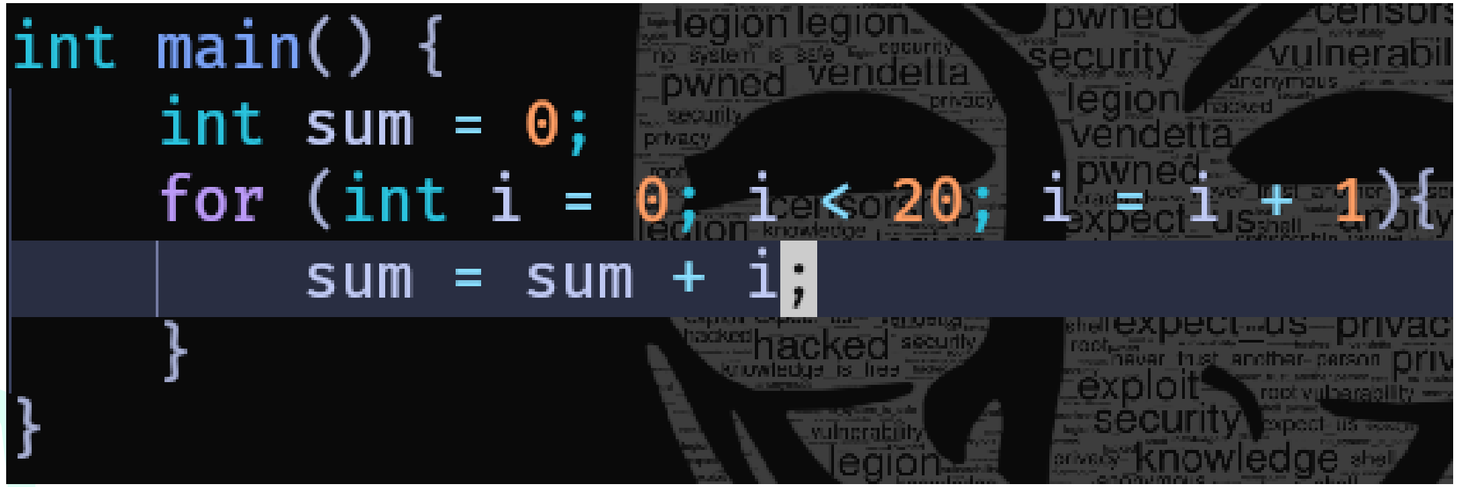
```
int main() {
    int a = 0;
    int sum = 0;
    while (a < 4){
        sum = sum + a;
        a++;
    }
}
```

while (condition is true)
{
do the stuff inside
}

For loop

Getting everything at once

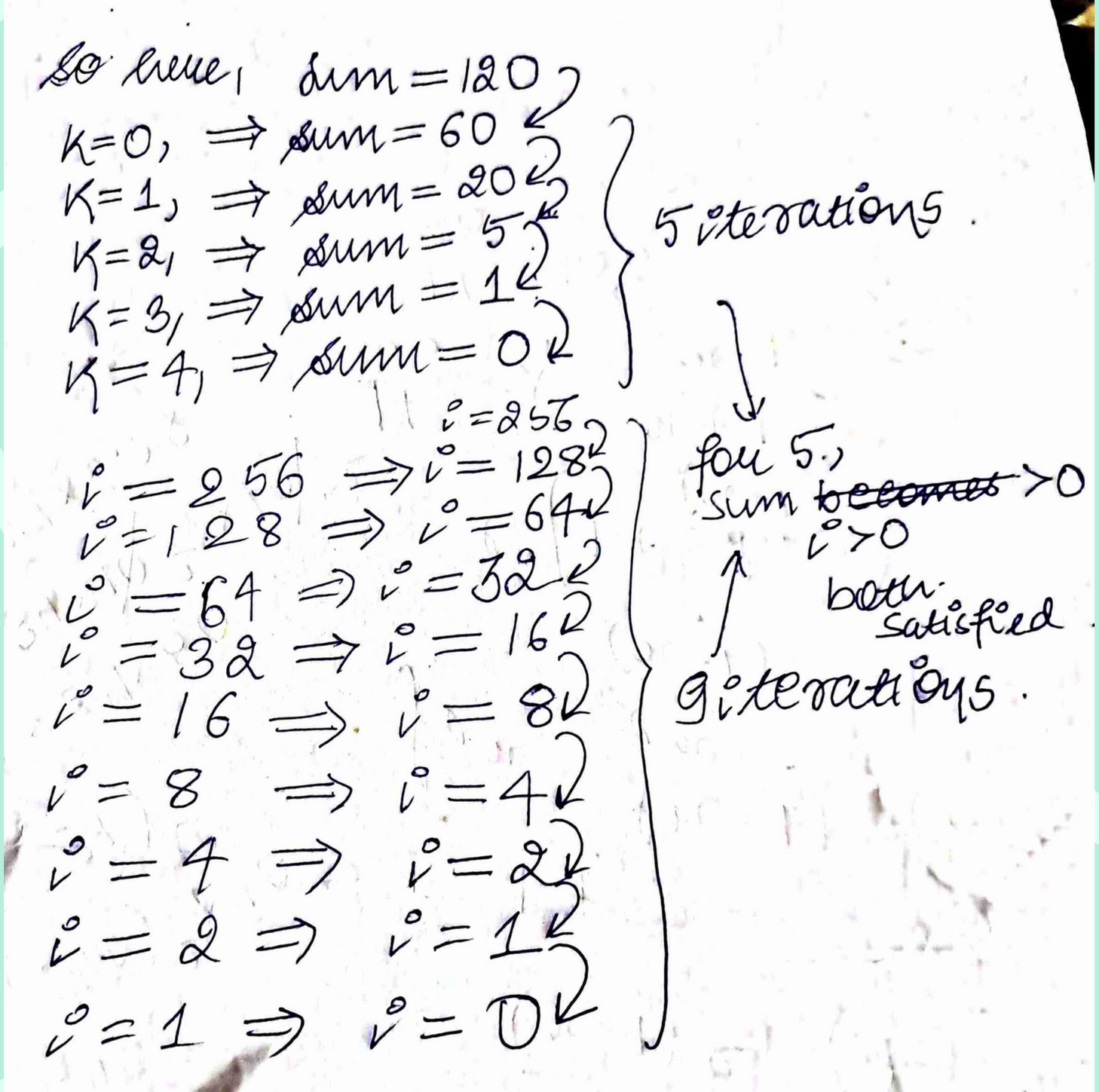
for (variable definition; condition; increment/decrement){
do various stuff
}



How many times will this loop iterate?

```
int main() {
    int u = 0, sum = 120;
    for (int i = 256, k = 0; i > 0 && sum > 0;
         k = k + 1, i = i / 2, sum = sum / (k + 1)) {
        u = u + i + sum;
    }
}
```

Ans: 5


So here, sum = 120
k=0, ⇒ sum = 60
k=1, ⇒ sum = 20
k=2, ⇒ sum = 5
k=3, ⇒ sum = 1
k=4, ⇒ sum = 0
5 iterations.
i=256
i = 256 ⇒ i = 128
i = 128 ⇒ i = 64
i = 64 ⇒ i = 32
i = 32 ⇒ i = 16
i = 16 ⇒ i = 8
i = 8 ⇒ i = 4
i = 4 ⇒ i = 2
i = 2 ⇒ i = 1
i = 1 ⇒ i = 0
for 5,
sum >0
i >0
both satisfied.
9 iterations.

while loop to for loop

variable declaration needed for while loop
while (**condition**){
do stuff
increment/decrement
}

for (**variable declaration**;**condition**;
increment/decrement){
do stuff
}

Arrays

What to Know?

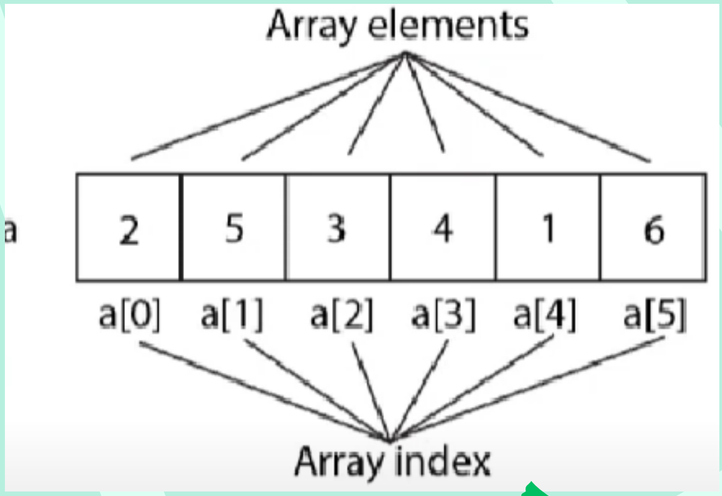
Definition: What exactly are arrays ?

Declaration of Arrays

Example of it's Working

Using array to Find Maximum

What is an Array?



A data structure to store some type of data(One Type in a particular array) in contiguous memory locations , so it's easily accessible .

How an Array is initialized?

- We can create arrays by specifying the datatype which we will store in the array, its name and its size(size can be a variable as well).
- Declaration is similar to how we declare any other variable but we have to write size of array inside square brackets after name..
- Once you declare array with size n then you can not change the size, so you can store at max n elements to your array.

```
DataType ArrayName[size];
float mark[50];
int age[n];
char symbol[9];
```

Example to understand its working

A simple code :

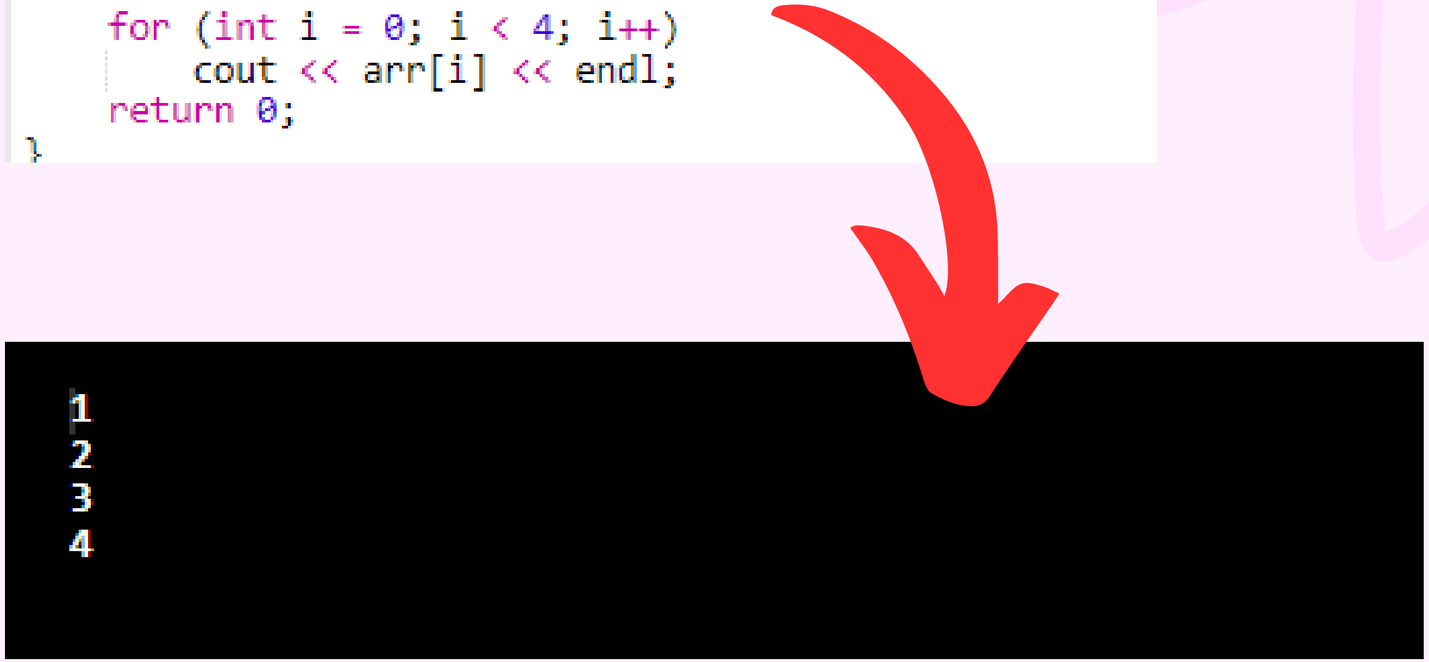
```cpp
#include <iostream>
using namespace std;

int main()
{

    int arr[10];

    arr[0] = 1;
    arr[1] = 2;
    arr[2] = 3;
    arr[3] = 4;

    for (int i = 0; i < 4; i++)
        cout << arr[i] << endl;
    return 0;
}
```



Using Array to Find Maximum Marks:

```
float max_mark = 0;
for(int i=0;i<50;i++)
{
    if(mark[i] > max_mark)
        max_mark = mark[i];
}
```