



# Scope of Variables

CS111 Lab Instructor: Chi Tse

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# What is Scope?

- The “scope” of a variable means the places in your code you can use it.
- All of our variables so far have been declared in blocks of code delineated by {  
}  
(such as the `int main()` function or other function, as well as loops and conditionals.)
- If a variable is declared in a block, it can only be used in that block (and sub-blocks).
  - i.e. the scope of variables declared within a function or any inner block cannot be used outside that block.

# Exercise 1:

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

```
int main () {
    int i = 15;
    for (int i=1; i<=10; i++)
        cout << i << " ";
    cout << i << endl;
    return 0;
}
```

- What's the output?

# Exercise 2:

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

```
int main () {
    //int i = 15;           //get commented out
    for (int i=1; i<=10; i++)
        cout << i << " ";
    cout << i << endl;
    return 0;
}
```

- What happens now? What is the error message that you get?

## Exercise 2 (con't):

```
for(int i=0;i<=10;i++){  
    cout<<i; //outputs "i"  
}  
cout<<i; //error!
```

This is true even without { }

```
for(int i=0;i<=10;i++)  
    cout<<i; //outputs "i"  
cout<<i; //error!
```

# Another example:

```
#include <iostream>
using namespace std;
int main() {
    int n = 8;
    for (int r = 1; r <= n; r++) {
        for (int c = 1; c <= n; c++) {
            cout << "*";
        }
        cout << "\n";
    }
    return 0;
}
```

Local variable c only accessible within the inner loop.

# Do you see an error below?

```
#include <iostream>
using namespace std;
int main() {
    int a = 5;
    if(a > 3) {
        string b = "hello";
        cout << b;
    } else {
        b = "hi";
        cout << b;
    }
    return 0;
}
```

# Answers to exercises:

- For exercise 1, the output is:

```
1 2 3 4 5 6 7 8 9 10 15
```

- For exercise 2, the error message that you get for out of scope is:

```
g++ scope.cpp -o scope
```

```
scope.cpp: In function "int main()":
```

```
scope.cpp:8: error: name lookup of "i" changed for ISO "for" scoping
```

```
scope.cpp:8: note: (if you use "-fpermissive" G++ will accept your code)
```