

Probably no subject causes as much angst for students as function arguments.

Let's review a few key points

- Functions appear in programs in three ways:
 - To *use* functions we *call* them
 - To *create* functions we *implement* them.
 - Just like variables, functions have to be *declared* before they can be *used* (called).
- Functions may or may not return a value
- Functions may or may not have arguments

Below is a very simple program with just one function.

Like many of the functions in your assignments (and unlike most functions in real programs) it is only called once.

Let's focus on the arguments

1. The function `hypot` is declared before `main`. We tell the compiler that, *when the function is called*, the arguments are to be doubles
2. `hypot` is called in `main`—`hypot(side1, side2)`—and *we don't say double in the call because side1 and side2 are known to be doubles*. The compiler checks the call against the declaration to make sure it is legal.
3. `hypot` is implemented after `main`. This is where we write the code to carry out whatever calls get made.

We're going to run the code. *Watch carefully what happens in memory.*



hypot.cpp

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

```
double hypot(double x, double y); // computes the hypoteneuse of a right triangle
```

```
int main(){
    double side1; // The two sides of the triangle adjacent to the right angle
    double side2;

    cout << "Please enter, separated by a space, the lengths of the "
         << "two adjacent sides of the right triangle: ";
    cin >> side1 >> side2;

    cout << "The hypoteneuse is: " << hypot(side1, side2) << endl;
    return 0;
}
```

```
double hypot(double x, double y) {
```

```
    return sqrt(x*x + y*y);
}
```

We used different names for the parameters (arguments) in the declaration than in the call.

We could have used the same names. Here's the same program, simply with same names. Run it and again *watch carefully what happens in memory*.



hypot2.cpp

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

```
double hypot(double side1, double side2); // computes the hypoteneuse of a right tri;
```

```
int main(){
    double side1; // The two sides of the triangle adjacent to the right angle
    double side2;

    cout << "Please enter, separated by a space, the lengths of the "
         << "two adjacent sides of the right triangle: ";
    cin >> side1 >> side2;

    cout << "The hypoteneuse is: " << hypot(side1, side2) << endl;
    return 0;
}
```

```
double hypot(double side1, double side2) {
    return sqrt(side1*side1 + side2*side2);
}
```

Here's the original program with two function calls in it.



hypot3.cpp

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

```
double hypot(double x, double y); // computes the hypoteneuse of a right triangle
```

```
int main(){
    double side1; // The two sides of the triangle adjacent to the right angle
    double side2;

    cout << "Please enter, separated by a space, the lengths of the "
         << "two adjacent sides of the right triangle: ";
    cin >> side1 >> side2;
```

```
cout << "The hypoteneuse is: " << hypot(side1, side2)<< endl;
cout << "The hypoteneuse of a triangle whose sides are one longer is: " <<
    hypot(side1 + 1.0, side2 + 1.0) << endl;
return 0;
}

double hypot(double x, double y) {
    return sqrt(x*x + y*y);
}
```

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