

Functions

Similar to the ones you've seen in math class:

Math: $f: \mathbb{R} \rightarrow \mathbb{R}$ $f(x) = ax^2 + bx + c$
class $a, b, c \dots$

C/C++ double f(double);
 output type input type

```
double f(double x)
{
    // rules for computing f(x).
    double r;
    r = a * x * x;
    r = r + b * x + c;
    return r;
}
```

Differences vs math functions:

① "Side-effects". Functions might do extra stuff, e.g. printing messages, or modifying global state.

② C/C++ functions might not produce the same result every time!

int a = 3; // defined outside all functions

```
→ int f(int n)
{
    a++;
    return n + a;
}
```

```

}

int main()
{
    int n = 7;
    → cout << f(7) << "\n"; // 11
    cout << f(7) << "\n"; // 12
    :
}

```

"function call"

Scope, by-value, by-reference params.

```

void f(int a)
{
    a++;
}

void g(int& a)
{
    a++;
}

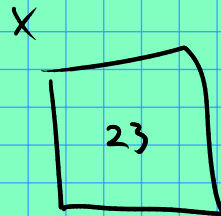
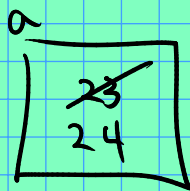
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```

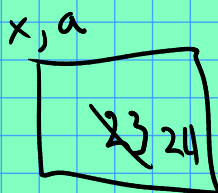
int main()
{
    int x = 23;
    f(x);
    cout << x << "\n";
    // prints 23

    g(x);
    cout << x << "\n"; // 24!
}

```



"by value"



"by reference"

