# C++ Functions

Like library functions, we can create our own functions

USE:

```
a = func1(b);
```

```
x = func2(y, 4.0) * 5.0;

r = func3();  // no arguments
```

Functions (usually) return a value back to the calling program

Function names follow same rules as variables



# Function Definition

```
int funcname(int arg1, float arg2)
  {
   // local variable declarations
   int val;

   // function body


   return val;
  }  // END func
```

*Note: main is a function, just like every other function*

# The void Data Type

void is the type that indicates no type!

Example – no return value:

```
void funca(int a, char x)
  {
   cout << "a is " << a << ", x is" << x << endl;
  }  // END funca
```

Example – no arguments:

```
float getPI(void)
  {
    return 3.1415926;
  }  // END getPI
```



# The Function Prototype

Every function must be known to the compiler before being used.
Serves same function as a variable declaration.

EX.

```
void funca(int, char);
int funcb(void);
```

- Prototype specifies the name of function and types of function and arguments.
- Names of argument variables don't need to be listed, ignored if specified.
- Note the semicolon at end of prototype! (No semicolon is allowed in the function definition!)

# A Function Example

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

int dosum(int, int, int);  // prototype

int main()
  {
   int a, b, c, d;
   int x, y, z, w;
   cin >> a >> b >> c;
   cin >> x >> y >> z;
   d = dosum(a, b, c);
   w = dosum(x, y, z) * 3;
   cout << d << "  " << w << endl;
  } // END main
```



# Example – the "dosum" function

```
int dosum(int r, int s, int t)
  {
   int sum;

   sum = r + s + t;

   return sum;
  } // END dosum
```

# Revised Program Organization

```
#include<iostream>
// other includes go here

using namespace std;

// function prototypes go here

int main()
  {
    //body of main program goes here

  } // END main

// function definitions go here
```



# Local Variables

```
int func(int, int);

int main()
  {
   int a = 3, b = 4;
   int i, n;

   i = 0;
   n = func(a, b);
   cout << i << n << endl;
  } // END main
```

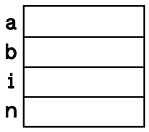
```
int func(int x, int y)
  {
   int i;

   i = x + y;

   return i;
   } // END func
```

What happens with the variable i?

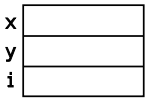
# Variable Scope

The "scope" of a variable consists of those parts of the program where that variable is accessible.

```
int main()
  {
   int i, n, a, b;
   i = 0;

   n = func(a, b);
   cout << i << n << endl;
  } // END main
```




```
int func(int x, int y)
  {
   int i;

   i = x + y;

   return i;
   } // END func
```




The scope of each i is the function where it is declared. It is called a "local" variable – separate memory is allocated for each i.

FUNC0090

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# Global vs Local Variables

```
#include <iostream>

int a, b, c;

int main()
  {
   int x, y, z;
        :
  } //END main

int func1 ()
  {
   int r, s, t;
        :

  } //END func1
```

a, b, c are global

x, y, z are local to main

r, s, t are local to func1

FUNC0100

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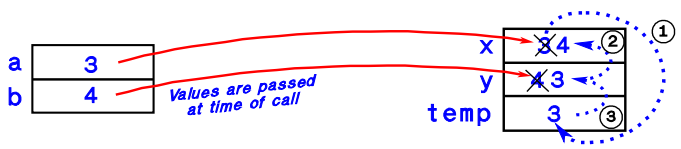
# Arguments – Call by Value

```
void swap(int, int);

int main ()
  {
   int a = 3, b = 4;
   swap(a, b);
   cout << a << b << endl;
  } //END main
```

```
void swap(int x, int y)
  {
   int temp;
   temp = x;
   x = y;
   y = temp;
  } // END swap
```

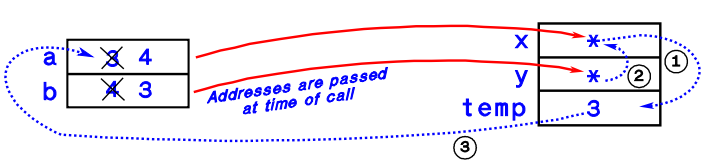



*Only the copies of values are swapped!*



# Arguments – Call by Reference

```
void swap(int&, int&);

int main ()
  {
   int a = 3, b = 4;
   swap(a, b);
   cout << a << b << endl;
  } //END main
```

```
void swap(int& x, int& y)
  {
   int temp;
   temp = x;
   x = y;
   y = temp;
  } // END swap
```