

## Chapter 2

# Numerical variables

Variables have types

```
int counter = 4;           // integer
double tempF = 72.5;     // floating point number
```

For now, we work mostly with type **double**.

Variables can be initialized or not

```
double tempF = 72.5;
double tempC;
double x, y, z;
```

→ **Please give your variables meaningful names.**

We can print out the value of a variable. The symbol `%lf` is a placeholder.

```
/*
A first exploration of numerical variables
*/

#include <stdio.h>
#include <math.h>
#include <stdlib.h>
int main()
{
  double x, y, z;
  x = 1.2;
  y = 3.4;
  z = x+y;

  printf("The sum is %lf. \n", z);
}
```

## 2.1 Input / output for numerical variables

Use `scanf("%lf", &<variable>);` for input.

The `%lf` tells the computer to expect a double (“long float”); the ampersand tells the computer to put the input in the location reserved for `<variable>`.

```

/*
basic input/output of numerical variables
*/

#include <stdio.h>
#include <math.h>
#include <stdlib.h>
int main()
{
double input1, input2, result;

// get inputs
printf("Give me two numbers:\n");
scanf("%lf", &input1);
scanf("%lf", &input2);

// print sum
result = input1+input2;
printf("%lf + %lf = %lf. \n", input1, input2, result);
}

```

Observe the use of comments to describe each section of code. This is a helpful way to organize your logic... and help you (and others) understand how your code works. Think of comments are “love letters to your future self.”

You can hit ENTER after each number, or you can simply enter in the two numbers with a space between them.

You can replace the two `\scanf( )` lines with a single line

```
scanf("%lf %lf", &input1, &input2);
```

## 2.2 Numerical operations

Basic operations

```
a+b      a-b      a*b      a/b
```

Built-in functions that act on double variables

```
sqrt(x), cos(x), sin(x), floor(x), fabs(x)
```

Functions that takes in two doubles

```
fmod(a,b), fmax(a,b), fmin(a,b)
```

Fill in the following in order to obtain a program called `operations.c` that allows you to test out these functions

```
/*
short program to test out mathematical operations
*/

#include <stdio.h>
#include <math.h>
#include <stdlib.h>
int main()
{
double input1, input2, result;

// get inputs

// compute operation and print output

}
```

## 2.3 Special arithmetic operation

Operating on a single variable

```
// replace value with value + 2.5
value = value + 2.5;

// replace counter with counter + 1
counter = counter + 1;
counter++;
```

## 2.4 Homework: `celsius2fahrenheit.c`

Write a program `celsius2fahrenheit.c` that converts temperatures from Celsius to Fahrenheit.

## 2.5 Homework: `change.c`

Write a program `change.c` that indicates how to make a given amount of change out of dollars, quarters, dimes, nickels, and pennies.

For example, given an input of `4.37` the program should return

```
4 dollars
1 quarters
1 dimes
0 nickels
2 pennies
```

Submit your code here:

<https://www.dropbox.com/request/BKBZYdMxp6yx2FIeejnM>