More Ifs

1 Selection from More Choices

The otherwise_code for an else statement might itself be an if–else construct. This is commonly thought of as if ... else if ... else. Here is an example:

```
if( waterTemp>100.0 )
  printf("Gas");
else if (waterTemp>0.0 )
  printf("Liquid");
else
  printf("Solid");
```

2 Boolean Variabales

A ***flag*** is a variable that has only two possible values (think true/false or on/off). In C a flag is often simulated by an int variable. Note that

C interprets 0 as false and any other value as true.

An example usage could be where we have a loop that can end for many reasons (bad input, problem solved, time elapsed). In this case, we do a loop which repeatedly checks the flag; in the body of the loop there are several places where the flag can be set (to set a flag is to make it true; to clear a flag is to make it false).

3 Logical Operators

For more complex boolean conditions, one can combine conditions with one of the ***logical operators***. The three most common of these are

```
&& || !
```

The `&&` means ***and***: the overall condition is true if both parts are true. The `||` means ***or***: the overall condition is true if either or both parts are true (sometimes called the inclusive or). The operator `!` means ***not***: it converts false to true and vice versa.

It is useful to know that the logical operators have lower ***precedence*** than the other operators such as arithmetic and relational. So to test if a given char is an upper-case letter, it is sufficient to write as follows (without more brackets):

```
if ( myChar >='A' && myChar<='Z' )
```

4 Sample Program: sequence.c

Here is a program that reads in a sequence from the user and then prints a message as to whether the sequence is strictly increasing, strictly decreasing, or neither.

```
// reads 10 numbers from user and says whether increasing or decreasing
#include <stdio.h>

int main( )
{
  const int LENGTH = 10;
  int isIncreasing = 1, isDecreasing = 1;
  float prev, current;
  int i;

  for(i=0; i<LENGTH; i++) {

      printf("Enter value ");
      scanf("%f", &current);

      if( i>0 && current<=prev)
           isIncreasing = 0;
      if( i>0 && current>=prev)
           isDecreasing = 0;
      prev = current;

  }

  if( isIncreasing )
      printf("Is strictly increasing\n");
  else if( isDecreasing )
      printf("Is strictly decreasing\n");
  else
      printf("Not strictly monotonic\n");

  return 0;
}
```