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SFWR ENG 2S03
Exercise Sheet 1

SFWR ENG 2S03 — Principles of Programming

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Please bring your programs to the tutorial!

Exercise 1.1

What is the output ot the following C program:

```
#include <stdio.h>
int main( void ) {
   int n=12;
   int c=0, r=0, s=1;
   while ( s ≤ n ) {
      c = c + 1;
      s = r + s;
      r = s − r;
      printf("c = %d \t r = %d \t s = %d\n", c, r, s);
   }
   printf("The result is %d.\n", c);
   return 0;
}
```

Describe what this program does, and add assertions in particular for the loop invariant!

Exercise 1.2 — ASCII Art (35% of Midterm 1, 2003)

Design and implement a C program that asks the user for a triangle height and then produces an ASCII-art isosceles triangle consisting of asterisks in the following way:

```
2S> ./triangle
Enter the desired triangle height: 4

   *
  ***
 *****
*******
```

```
2S> ./triangle
Enter the desired triangle height: 7

      *
     ***
    *****
   *******
  *********
 ***********
*************
```

Assume that the user will input only numbers! Do not use arrays!

Exercise 1.3

Section 23 (reproduced below) of the Canadian Charter of Rights and Freedoms (part of the constitution of Canada, available at http://laws.justice.gc.ca/en/const/annex_e.html#I), defines the rights of parents to have their children receive school instruction in one of the two official languages of Canada.

Design and implement a C program that asks the user a series of questions, beginning with *"Which language do you want your child to receive school instruction in?"*, and finally prints out information whether the user has the right to this.

(For the purposes of this exercise, it is acceptable if your program uses only English interaction.)

23. Minority Language Educational Rights

(1) **(Language of instruction)** Citizens of Canada

(a) whose first language learned and still understood is that of the English or French linguistic minority population of the province in which they reside, or

(b) who have received their primary school instruction in Canada in English or French and reside in a province where the language in which they received that instruction is the language of the English or French linguistic minority population of the province,

have the right to have their children receive primary and secondary school instruction in that language in that province.

(2) **(Continuity of language instruction)** Citizens of Canada of whom any child has received or is receiving primary or secondary school instruction in English or French in Canada, have the right to have all their children receive primary and secondary school instruction in the same language.

(3) **(Application where numbers warrant)** The right of citizens of Canada under subsections (1) and (2) to have their children receive primary and secondary school instruction in the language of the English or French linguistic minority population of a province

(a) applies wherever in the province the number of children of citizens who have such a right is sufficient to warrant the provision to them out of public funds of minority language instruction; and

(b) includes, where the number of those children so warrants, the right to have them receive that instruction in minority language educational facilities provided out of public funds.