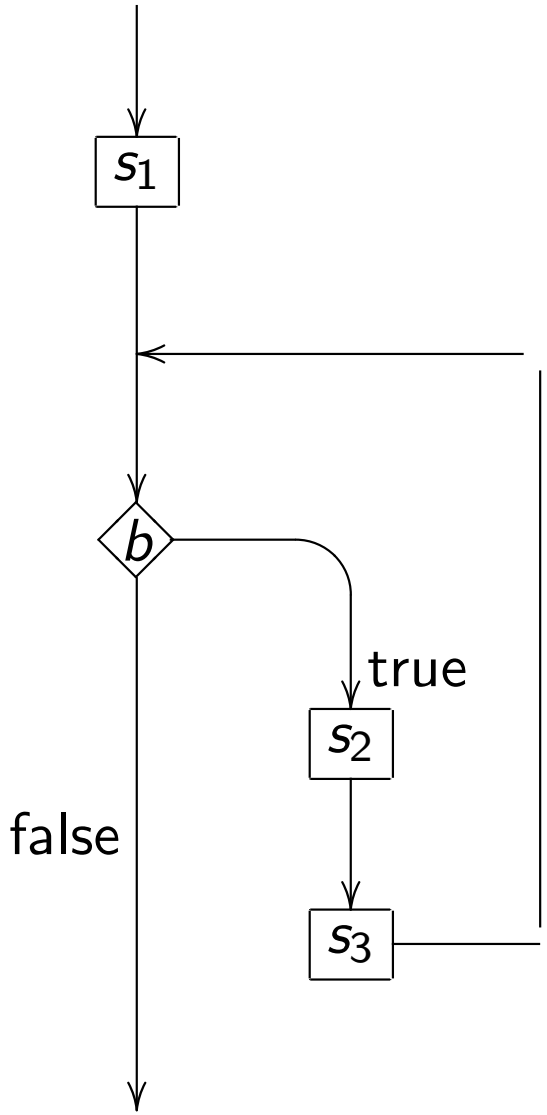
For statement



For statement

Syntax:

for $(s_1;\ b;\ s_3)$ {
    s_2;
}

Code conventions:

- for should be followed by a space and
- the body should be indented.

Line of stars

```
output.print("Enter a non-negative integer: ");
int number = input.nextInt();

for (int i = 0; i < number; i++) {
    output.print("*");
}
output.println();
```

Line of blocks

Problem

Prompt the user for a non-negative integer

```
Enter a non-negative integer:
```

so that the integer c is entered by the user on the same line as the prompt. Using the class franck.cse1020.Grid, create a grid with one row and c columns, every second make a cell of the grid red (going from left to right).

Line of blocks

Exercise

Prompt the user for a non-negative integer

```
Enter a non-negative integer:
```

so that the integer c is entered by the user on the same line as the prompt. Using the class franck.cse1020.Grid, create a grid with one row and c columns, every second color a cell of the grid, alternating red and black (going from left to right).

Line of numbers

Problem

Prompt the user for a non-negative integer

```
Enter a non-negative integer:
```

so that the integer n is entered by the user on the same line as the prompt. On the next line, print 1, 2, ... $n-1$, n, separated by a single space.

Block of stars

Problem

Prompt the user for two positive integers

```
Enter the number of rows:
Enter the number of columns:
```

so that the integers r and c are entered by the user on the same line as the prompts. Print r lines each consisting of c $*$'s.

Block of blocks

Problem

Prompt the user for two positive integers

```
Enter the number of rows:
Enter the number of columns:
```

so that the integers r and c are entered by the user on the same line as the prompts. Using the class franck.cse1020.Grid, create a grid with r rows and c columns, every second make a cell of the grid red (going from left to right, and from top to bottom.)

Block of blocks

Exercise

Prompt the user for two positive integers

```
Enter the number of rows:
Enter the number of columns:
```

so that the integers r and c are entered by the user on the same line as the prompts. Using the class franck.cse1020.Grid, create a grid with r rows and c columns, every second color a cell of the grid, alternating red and black (going from left to right, and from top to bottom.)

Tree

Problem

Prompt the user for a positive integer

```
Enter the height of the tree:
```

so that the integer h is entered by the user on the same line as the prompts. Print a tree of height $h + 1$. For example, if $h = 4$, print

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

Exercise

Prompt the user for a positive integer

```
Enter the height of the tree:
```

so that the integer h is entered by the user on the same line as the prompts. Print a tree of height $h + 1$ using the class franck.cse1020.Grid.

Print a file

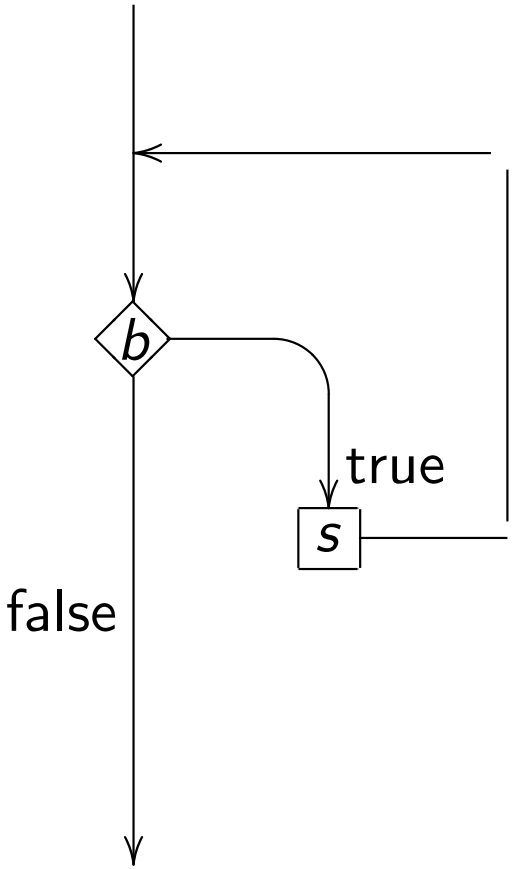
Problem

Prompt the user for a file name

```
Enter a file name:
```

so that the name is entered by the user on the same line as the prompt. Print the content of the file.

While statement



While statement

Syntax

```
while (b) {
    s;
}
```

Code conventions:

- while should be followed by a space and
- the body should be indented.

For and while loops

Theorem

Every for-loop can be expressed as a while-loop.

Proof.

for $(s_1;\ b;\ s_2)$ {
    s_3;
}

can be expressed as

{
    s_1;
    while (b) {
        s_3;
        s_2;
    }
}

For and while loops

Theorem

Every while-loop can be expressed as a for-loop.

Print a triangle

Problem

Prompt the user for a positive integer

```
Enter a positive integer:
```

so that the integer n is entered by the user on the same line as the prompts. Print a line with 1 $*$, a line with 2 $*$'s, ..., a line with $n-1$ $*$'s, and a line with n $*$'s.

Reprompt

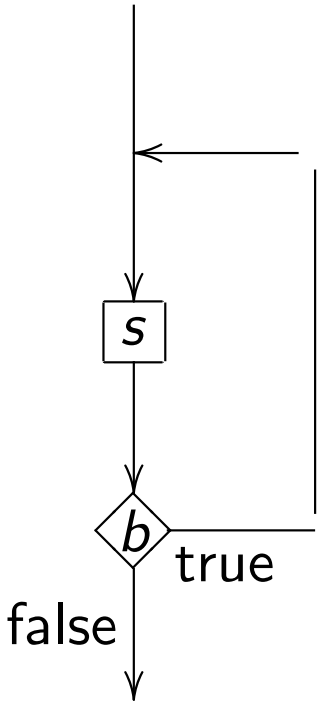
Problem

Prompt the user for a positive integer

```
Enter a positive integer:
```

so that the integer n is entered by the user on the same line as the prompts. Print a line with 1 $*$, a line with 2 $*$'s, ..., a line with $n-1$ $*$'s, and a line with n $*$'s. Reprompt the user if they enter a non-positive integer.

Do statement



Do statement

Syntax

```
do {
    s;
} while (b);
```

Code conventions:

- while should be followed by a space and
- the body should be indented.

For and do Loops

Theorem

Every for-loop can be expressed as a do-loop.

Theorem

Every do-loop can be expressed as a for-loop.

Question

So which loop should we use?

For and do Loops

Theorem

Every for-loop can be expressed as a do-loop.

Theorem

Every do-loop can be expressed as a for-loop.

Question

So which loop should we use?

Answer

It is a matter of taste. If you know the number of iterations in advance, a for-loop may be most appropriate. If the loop has to be executed at least once, a do-loop may be most appropriate.

Prime

Exercise

Prompt the user for a positive integer

```
Enter a positive integer:
```

so that the integer n is entered by the user on the same line as the prompt. On the next line, print

n `is prime`

if n is prime and

n `is not prime`

otherwise.

The New York Times

New Method Said to Solve Key Problem in Math

By Sarah Robinson

Three Indian computer scientists have solved a longstanding mathematics problem by devising a way for a computer to tell quickly and definitively whether a number is prime – that is, whether it is evenly divisible only by itself and 1.

New York Times, August 8, 2002

Review lecture

- When: Thursday February 6, 17:00-19:00
- Where: Vari Hall, lecture hall D
- Material: review of Chapter 3 and 4 of the textbook

Test 3

- When: Friday February 7, during the lab (14:30–16:00)
- Where: Lassonde building, labs 1006, 1004, 1002
- Material: Chapter 1–4 of the textbook, with a focus on Chapter 3 and 4
- What: One programming question similar to Check03A and Check04D and five multiple choice/short answer questions
- Advise: Do the five multiple choice/short answer questions first
- Note: You get 1 mark (out of 5) for the fact that your code compiles
- Note: Your code is not only marked for correctness (3 marks out of 5) but also style (1 mark out of 5)

APIs

Most likely, tomorrow I will post the APIs of the new classes you will have to use in Friday's test on Moodle.

To do

- Study the remainder of Chapter 5.