C++

C++ is C language with addition of
- classes (for object-oriented programming)
- templates (having types as parameters)

Differences in basic syntax

- `#include <filename>` instead of `#include <filename.h>`
- Have new set of libraries and include-files, used by default
- include-files for C may be used by prefixing their names with "c"
- `cin` and `cout` replace `scanf` and `printf`
  Syntax:
  `cin >> <variable name>` where `variable name` may be a variable of type `int`, `char` or `string`
  `cout << <variable-or-string 1> << <variable-or-string`
  where `variable-or-string` is either a string constant, which is printed directly, or a variable of type `int`, `char` or `string`, in which case its current value is printed.

`cin` and `cout` may be extended to cover user-defined datatypes

Classes

C++ has classes similar to Java
Class definition has two parts:
- Listing types of fields and member functions
- Definition of member functions

keywords `public`, `private` and `protected` have same meaning as in Java
Operations `new` and `delete` create and delete objects of classes
`new` creates new object, calls constructor function and returns *pointer* to object
no automatic garbage collection ⇒ programmer must call `delete` to free memory

Abstract classes

C++ implements class hierarchy in two ways:
- Subclasses may override member functions
- Have `abstract classes`: class may not provide implementation of all member functions via keyword `virtual`

Have multiple inheritance:
one class may implement member functions for *several* abstract classes

Exceptions

work in same way as in Java
raised by several library functions in C++, eg `new` and `delete`
$\Rightarrow$ important to catch them.