C++ Programming for CE
C++PCE
Winter Term 2014/2015

Assignment sheet A

Assignments that are marked with *StudOn submission* are **mandatory** and must be submitted via StudOn in time – please see there for deadlines.

Getting Started

1 Compiling: Encoder (`A1_encoder.cpp`)

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Please retrieve the source code file `A1_encoder.cpp` from StudOn. It implements a very weak cipher, but for now you do not need to understand the way this code works. Just put your name in line 31 and compile the program. Run it, store its output in a file and submit that file via StudOn.

If you run your program from a command line, you can use redirection in nearly the same way on Linux, MacOS X and Windows, by calling `./program > file`.

2 Coding: Factorial (`A2_fac.cpp`)

Write a program that prompts the user to enter a number and then uses a `for` loop to calculate the factorial of the given number and writes it to the standard output.

Verify your program at least against the following *test cases*, it should at least pass the first line. If it fails any of the other test cases, you should find the cause.

$$0! = 1 \quad ; \quad 1! = 1 \quad ; \quad 6! = 720 \quad ; \quad 12! = 479001600$$
$$13! = 6227020800 \quad ; \quad 21! \approx 5.1091e19$$
$$35! \approx 1.0333e40 \quad ; \quad -1! = ?$$

3 Coding: Range sum (`A3_rangesum.cpp`)

Write a program that queries the user for two numbers and sums the numbers in that range. To do so, use a loop like this one:

```
[...]
for ( unsigned i=first_number ; i!=second_number ; ++i ) {
  [...]
```

Test your code briefly, for instance using the limits 3 and 7, first.

Predict the outcome if you swap the order to 7 preceding 3. Check if the actual results match your expectation. If not, restudy the behavior of `for` and `while` loops until you understand what happened.

4 Coding: Range dump (`A4_rangedump.cpp`)

Write a program that prompts the user for two numbers and writes all numbers in the range between both numbers to the standard output.

Example sessions (you may prefer to choose another text for the queries):

```
# ./A3_range
Gimme a limit: 3
Gimme another: 5
3 4 5
# ./A3_range
Gimme a limit: 7
Gimme another: 3
7 6 5 4 3
```

Variables and Basic Types

5 Literal constants

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Determine the type of each of these literal constants:

(a) `-10` _____

(b) `-10U` _____

(c) `false` _____

(d) `-10.` _____

(e) `-10E-2` _____

(f) `'\t'` _____

6 Names

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Which, if any, of the following names are invalid?

(a) `int double = 3.14159;` ☐ correct ☐ invalid

(b) `bool catch-22;` ☐ correct ☐ invalid

(c) `float Float = 3.14F;` ☐ correct ☐ invalid

(d) `char _;` ☐ correct ☐ invalid

(e) `char 1_or_2 = '1';` ☐ correct ☐ invalid

7 Code Fragment: sum i

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Given the following program fragment, what values are printed?

```
int i = 100, sum = 0;
for( int i = 0; i != 10; ++i )
    sum += i;
std::cout << "  i: " << i << std::endl;
std::cout << "sum: " << sum << std::endl;
```

i: _____

sum: _____

8 Code Fragment: sum ii

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What is the output of the following program fragment?

```
const unsigned int length1 = 10U, length2 = 12U;
unsigned int sum = 0U;
for( unsigned int i = 0U; i < length1-length2; ++i )
    sum += i;
std::cout << "sum: " << sum << std::endl;
```

sum: _____

9 Code Fragment: sum iii

What is the output resulting from the following program fragment?

```
unsigned int sum = 0U;
for( unsigned int i=100U; i>=0U; --i )
    sum += i;
std::cout << "sum: " << sum << std::endl;
```