MTH6150

Numerical Computing in C and C++

Exercise Sheet 1

1. Following the instructions in the document "Visual Studio quick guide", which is on QMPlus, do the following:

   - Start Visual Studio;
   - Create a new project;
   - Add a C++ file (type .cpp) to this project.

2. Type the code from slide 29 (slide title "A first program") into the C++ file. Please type the code yourself rather than copying and pasting, so that you remember the syntax better.

3. Compile this program:

   - by selecting Build -> Build Solution
   - or by using the keyboard shortcut Ctrl + Shift + B

   The Visual Studio guide has more details about what to do if there is an error.

4. Once you have successfully compiled the code, run the program that you have created:

   - by selecting Debug -> Start Without Debugging
   - or by using the keyboard shortcut Ctrl + F5

   In the black screen that appears (the console), you may get a message about "UNC paths not supported...". This is because the project is in a network location, and the message can be ignored. Below that should be the output from your program.

5. Try adding comments to the code using both the methods mentioned on slides 35-36. Check that the program still compiles successfully, and that the output is the same as without the comments.

6. Modify the code to see what happens in the following cases:

   - Leave out the line `#include` `<iostream>`
   - Leave out the line `using namespace` `std;`
   - Leave out the semi-colon `;` at the end of a line.
   - Replace `cout` with `Cout`
   - Remove some line breaks so that multiple commands are on the same line.

7. Replace

```
cout << "Hello, world" << endl;
```

with two commands as follows:

```
cout << "Hello";
cout << "world";
```

After running this, modify the code to have a space between the two words, by changing `"Hello"` to `"Hello "`

Also add a line break to the output after `"world"`.

8. Type in the code on slide 40, compile and run it.

Write similar expressions using `exp`, `log10`, `sin`, `cos`, `tan` and check that the results are what you expect (`log` is the natural log).

To calculate e.g. $sin\,(\pi/2)$, you could use:

```
double pi = 3.14159265359;
double y = sin(pi/2);
```

Try combining functions, as in

```
double x = 3.1;
double y = exp(log(x));
cout << y << endl;
```