University of Nottingham
School of Mathematical Sciences

Deadline: 8th January 2024, 15:00 (GMT) **Coursework 2 – Solution Template**

Your solutions to the assessed coursework must be submitted using this template or in a format that looks like the output of this template. Please place the output from your codes and any graphs produced in the correct parts of this file. Sample LaTeX is provided below for including tables and figures. Once this template has been completed, you must create a pdf file for submission. Under Windows 10 or Mac you can use Texmaker; from the Windows Virtual Desktop this may be accessed as follows:

```
Start > UoN Application > (UoN) Texmaker 5
```

(or search for Texmaker). Open the file `coursework2_submission.tex` *under* `File`*; to build the pdf file, click the arrow next to* `Quick Build` *to generate the file* `coursework2_submission.pdf`*. The first time you do this you may be asked to allow additional packages to be installed – you should agree to this.*

You may use an alternative document processing system, such as Word, to produce a pdf file containing your results, plots and answers. However, if you do, you must format your answers in the same way as suggested below.

A single zip file containing all the files in the requested folders in the checklists below should be submitted, along with the file `coursework2_submission.pdf`*, containing your answers, through the module webpage on Moodle. Note that (to help with marking) all parameters and values should be set within your codes: do NOT use inputs such as those obtained with* `std::cin` *or from the command line.*

STUDENT NUMBER

Question 1

File checklist for folder `Q1`:

- `AbstractODESolver.cpp`, `AbstractODESolver.hpp`
- `Driver.cpp`
- `ForwardEulerSolver.cpp`, `ForwardEulerSolver.hpp`
- `LinearODE.cpp`, `LinearODE.hpp`
- `ODEInterface.cpp`, `ODEInterface.hpp`
- For any additional files, provide a `README.txt`

1(d) Include your plots, screen output and comments here.

```
%%%%%%%%%%%%%%%%%%% Output of Driver.cpp %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
 Copy and paste to here
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

Figure 1: Example showing how to include a figure.

column 1	column 2
⋮	⋮
⋮	⋮

Table 1: Example showing how to include a table (if needed).

Question 2

File checklist for folder `Q2`:

- `AbstractODESolver.cpp`, `AbstractODESolver.hpp`
- `Driver.cpp`
- `LinearODE.cpp`, `LinearODE.hpp`
- `ODEInterface.cpp`, `ODEInterface.hpp`
- `TrapezoidalSolver.cpp`, `TrapezoidalSolver.hpp`
- For any additional files, provide a `README.txt`

2(b) Include your plots, screen output and comments here.

```
%%%%%%%%%%%%%%%%%% Output of Driver.cpp %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

Question 3

File checklist for folder `Q3`:

- `AbstractODESolver.cpp`, `AbstractODESolver.hpp`
- `Diffusion.cpp`, `Diffusion.hpp`
- `Driver.cpp`
- `ForwardEulerSolver.cpp`, `ForwardEulerSolver.hpp`
- `GaussianElimination.cpp`
- `Matrix.cpp`, `Matrix.hpp`
- `ODEInterface.cpp`, `ODEInterface.hpp`
- `TrapezoidalSolver.cpp`, `TrapezoidalSolver.hpp`
- `UniformGrid1D.cpp`, `UniformGrid1D.hpp`
- `Vector.cpp`, `Vector.hpp`
- For any additional files, provide a `README.txt`

3(a) Include your comments here.

3(c) Include your plots, screen output and comments here.

```
%%%%%%%%%%%%%%%%%% Output of Driver.cpp %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

Question 4

File checklist for folder `Q4`:

- `AbstractODESolver.cpp`, `AbstractODESolver.hpp`
- `Advection.cpp`, `Advection.hpp`
- `Driver.cpp`
- `ForwardEulerSolver.cpp`, `ForwardEulerSolver.hpp`
- `GaussianElimination.cpp`
- `Matrix.cpp`, `Matrix.hpp`
- `ODEInterface.cpp`, `ODEInterface.hpp`
- `TrapezoidalSolver.cpp`, `TrapezoidalSolver.hpp`
- `UniformGrid1D.cpp`, `UniformGrid1D.hpp`
- `Vector.cpp`, `Vector.hpp`
- For any additional files, provide a `README.txt`

4(b) Include your plots, screen output and comments here.

```
%%%%%%%%%%%%%%%%%% Output of Driver.cpp %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

4(c) Include your plots, screen output and comments here.

Question 5

File checklist for folder `Q5`:

- `AbstractODESolver.cpp`, `AbstractODESolver.hpp`
- `BlackScholes.cpp`, `BlackScholes.hpp`
- `Driver.cpp`
- `ForwardEulerSolver.cpp`, `ForwardEulerSolver.hpp`
- `GaussianElimination.cpp`
- `Matrix.cpp`, `Matrix.hpp`
- `ODEInterface.cpp`, `ODEInterface.hpp`
- `TrapezoidalSolver.cpp`, `TrapezoidalSolver.hpp`
- `UniformGrid1D.cpp`, `UniformGrid1D.hpp`
- `Vector.cpp`, `Vector.hpp`
- For any additional files, provide a `README.txt`

5(a) Include your comments here.

5(b) Include your plots and comments here.