Numerical Solutions of Differential Equations - Project #3

due 2023 MAY 29, 10:00 a.m.

1 The assignment

The programming assignments in Section 11.7 weigh 100 points.

Caution: You must use a *factory* pattern and a *singleton* pattern such as those covered in class or those discussed in the book by A. Alexandrescu, *Modern C++ design*, Addison-Wesley, 2001. Otherwise 30 points will be deducted from your score.

Extra credits: If the story in your report is extremely good in terms of software design, interesting new methods/tests, and insights that relate mathematical theory to numerical results, you can earn extra credit up to 20 points.

2 How to submit

Your submission must contain

(a) the LaTeX source code and its Makefile so that the command "`make story`" generates a document that contains the story required in Section 1,

(b) a `C++` package so that the command "`make run`" would trigger the compilation of your source code, the production of the executable, the running of your tests, the display of test results, and even the generation of the elements in your story.

You should archive your source code in a single gzipped tar ball (**format**: `YourName_project3.tar.gz`) and send it to the TA's email. A number of tips are given as follows.

(i) You can use either `GNU Make` or `cmake` or a mixture of them.

(ii) You may use either `GNU plot` or `matlab` to plot your results.

(iii) You can use Chinese or English for the story document.

(iv) Your gzipped tar ball should neither contain anything that can be generated from your Makefile, nor contain anything irrelevant to this homework. In other words, your answers to this homework should be both *sufficient* and *necessary*.

(v) You are encouraged to use a unit test framework such as `CppUnit`; of course you can choose your own unit-test framework as you see fit.