

FYS3150 Project 1

Your name(s) here
(Dated: August 31, 2021)

<https://github.com/nevlunghavn/fys3150>

PROBLEM 1

Given the one-dimensional Poisson equation

$$-\frac{d^2u}{dx^2} = f(x) = 100e^{-10x}, \quad (1)$$

we wish to show that

$$u(x) = 1 - (1 - e^{-10})x - e^{-10x} \quad (2)$$

is a solution. Differentiating 2 twice

$$\begin{aligned} \frac{du}{dx} &= (1 - e^{-10})x - e^{-10x} \\ \Rightarrow -\frac{d^2u}{dx^2} &= 100e^{-10x} \\ &= f(x) \end{aligned}$$

□

PROBLEM 2

- The C++ program `problem2.cpp` in the github repository is a basic program consisting of three functions: a function to generate and return the x array, a function to evaluate equation 2 at each x value and return the $u(x)$ array and the main function which calls the former and writes the results to a file.
- The Python program `problem2.py` in the github repository is used to read the data file produced by the C++ program and plot the data using `matplotlib`. The resulting plot is shown in figure 1.

Next up is a table, created using the `table` and `tabular` environments. We refer to it by table I.
Finally, we can list algorithms by using the `algorithm` environment, as demonstrated here for algorithm 1.

Number of points	Output
10	0.3086
100	0.2550

TABLE I. Write a descriptive caption here, explaining the content of your table.

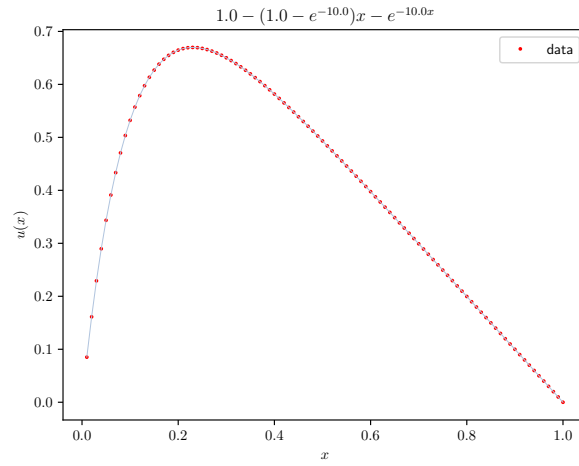


FIG. 1. Equation 2 is evaluated at a discrete set of points shown in red. The blue line has no significance and is only a visual aid.

Algorithm 1 Some algorithm

Some maths, e.g $f(x) = x^2$.

▷ Here's a comment

for $i = 0, 1, \dots, n - 1$ **do**

 Do something here

while Some condition **do**

 Do something more here

Maybe even some more math here, e.g $\int_0^1 f(x)dx$
