In this lab, a 1D heat equation was implemented using the forward Euler approach. In order to analyze the accuracy of this method, a manufactured solution was given. The data for that solution was calculated and the solver was used to solve the heat equation. The error and convergent rate was estimated using the manufactured solution.

This folder contains:

This folder contains the following documents:
Makefile: which helps the compilation of the lab.
manufactured.cpp: the implementation of this lab
README: the documentation
Report: the report of this lab

To compile and run the code, linux system with g++ compiler is required. The compiler should support the c++ 11 feature.

To compile the code, type make in the terminal.
To run the code, type ./manufactured.x

Code test and output:

space convergence:
n=40, The average l2 error norm is: 0.000141781
n=80, The average l2 error norm is: 2.53723e-05
n=160, The average l2 error norm is: 4.51306e-06
n=320, The average l2 error norm is: 8.00288e-07
time convergence:
number of time grids=500, The average l2 error norm is: 1.45679e-05
number of time grids=1000, The average l2 error norm is: 1.45637e-05
number of time grids=2000, The average l2 error norm is: 1.45616e-05
number of time grids=4000, The average l2 error norm is: 1.45605e-05