Project 2

Use Chebyshev spectral method to solve the following Burgers' equation:

$$\begin{aligned}
&\frac{\partial u}{\partial t} + \frac{\partial}{\partial x}\left(\frac{u^2}{2}\right) = 0.02\frac{\partial^2 u}{\partial x^2},\\
&u(-1,t) = 1, \quad u(1,t) = -1,\\
&u(x,0) = u_0(x),
\end{aligned}$$

where

$$u_0(x) = -\sin\left(\frac{5}{2}\pi x\right).$$

Present the numerial solutions at $t = 0.3k$ for $k = 0, 1, \cdots$ until the solution no longer changes (this problem has a "steady state").

Submit the following to Canvas when finishing your project:

- The source code;
- A simple report including a description of the numerical method and the figures showing the numerical results.

Please complete your submission no later than 23 April, 2023.