

**Practice 9**

Consider the conservation law

$$\frac{\partial u}{\partial t} + 2 \frac{\partial u}{\partial x} = 0 \quad \text{in} \quad 0 < x < L, \quad 0 < t < T \quad (9.1)$$

with

$$\begin{aligned} u(x, 0) &= \cos^2 x, \quad 0 < x < L, \\ u(0, t) &= 1, \quad 0 < t < T. \end{aligned} \quad (9.2)$$

**Task.** Solve the conservation law (9.1), (9.2) by the Lax-Friedrichs method, which utilizes the FTCS (forward in time, centered in space) scheme with numerical dissipation term of  $\frac{1}{2}$ , for  $L = 10$  and  $T = (1.25, 2.5, 5)$ . Draw the graphs.

The following stability condition must be satisfied:

$$\left| 2 \frac{\Delta t}{\Delta x} \right| \leq 1.$$

**(3 points)**