1. Solve the 1-D advection equation:

$$\frac{\partial f}{\partial t} + U\frac{\partial f}{\partial x} = 0,$$

with various schemes. Essential values and the schemes to refer are given in 'HW9.m'. Plot the final time-step solution with the corresponding exact solution for each numerical method.

① Solve the equation numerically using the Lax (Lax-Friedrichs) method.

② Solve the equation numerically using the Leapfrog method. For the first time integration, use the **upwind scheme**.

③ Solve the equation numerically using the Lax-Wendroff's method.

④ Solve the equation numerically using using MacComack method.