Consider the linear advection equation

\[
\frac{\partial \Theta}{\partial t} + \frac{\partial \Theta}{\partial x} = 0
\]

where \( x \in [0, 10] \) with periodic boundary conditions.

Consider also two different initial conditions

(a) \( \Theta_0(x, 0) = \sin(2\pi x) \)
(b) \( \Theta_0(x, 0) = \begin{cases} 
1, & x \in [1, 2] \\
0, & \text{elsewhere}
\end{cases} \)

Compute the solution on a 128-point mesh for both initial conditions and for CFL = 0.8. Compare the first- and second-order upwind schemes versus the Lax-Wendroff scheme after 100 time steps and after 10,000 time steps.