

# M269B: HOMEWORK 4

*Due Friday, Feb 13*

Strickwerda: 4.1.1, 5.1.1, 5.1.2

## Computational

Consider the following initial boundary value problem for the one-way wave equation:

$$u_t + u_x = 0, \quad x \in [0, 2], t \in (0, 2] \quad (1)$$

with the periodic boundary conditions  $u(0, t) = u(2, t)$  and initial condition given by

$$u(x, 0) = 1 \quad 1/2 \leq x \leq 3/2 \quad (2)$$

$$u(x, 0) = 0 \quad \text{otherwise} \quad (3)$$

Solve the above using the standard leap-frog scheme for  $t \in [0, 2]$  for  $\Delta x = 1/20, 1/40, 1/80$ . Turn in plots of the error and computed solution at  $t = 2$ . Discuss the behavior of the computed solutions.