

# Math 269B: Assignment 1

Assigned Friday Jan 11, due Friday Jan 8

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## Theory

[1]-[4] Problems 1.1.1, 1.1.6, 1.4.2, 1.5.2 of Strikwerda.

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## Computation

[5] Solve the system

$$\begin{aligned}u_t + u_x &= 0 \\u_0(x) &= 0 \quad \text{for } |x| > 1 \\&= 1 - |x| \quad \text{for } |x| < 1\end{aligned}$$

on the interval  $0 \leq t \leq 1$ ,  $-2 < x < 2$ . For the numerical method use boundary data  $v=0$  at  $x=2$  and  $x=-2$ . Plot the solution at time 1 for the following values of  $h$  and  $k$

(a)  $h = .1$  and  $.01$  for  $\lambda=2$  for the Lax-Friedrichs method

(b)  $h = .1$  and  $.01$  for  $\lambda=0.5$  for the Lax-Friedrichs method

(b)  $h = .1$  and  $.01$  for  $\lambda=0.5$  for the forward time/centered space method. Plot the solution at  $t=.2$  instead of  $t=1$ .

**Note:** You can use the following matlab program (with slight modification) to do this.

[OneWayWaveSolver.m](#)

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## What You Should Turn In

- Answers to the theoretical problems.
- The graphs and answers to the computational problem 5 and a listing of your program.