

# Math 269B: Assignment 4

*Assigned Friday Feb 1, due Friday Feb 8*

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## Theory

[1], [3] Problems 3.2.1, 3.3.8, 3.5.10 of Strikwerda.

[4] Extend the Sherman-Morrison formula to a matrix of the form  $M=A+u_1v_1^T+u_2v_2^T$ , as in Crank-Nicolson with periodic coefficients.

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## Computation

[5] Repeat problem [5] from HW2 for the Crank-Nicolson method, using the Thomas algorithm to invert the linear system for  $u^{n+1}$

- (i) First do this using boundary conditions  $u=0$  on both sides for time up to 1.
  - (ii) Second do this for periodic BCs, using the the results of [4] to handle the non-tridiagonal entries.
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## What You Should Turn In

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