Test 2 Topics
APM 522 Numerical Methods for Partial Differential Equations

- PS 4–7 + Lectures
- *Omit* [Topics in brackets] & programs
- Laplace’s & Poisson’s Equations & Iterative Methods
  1. Jacobi, Gauss-Seidel, SOR methods (*memorize!*)
     *Omit* Conjugate Gradient Method
- Hyperbolic Methods: upwind, Lax-Friedrichs, Lax-Wendroff
  2. Order of accuracy/modified PDE
  3. $|G(k)|^2 = G^*(k)G(k) \leq 1$ Fourier stability
- 4. Conservative Methods &/or Positivity-Preserving Methods

A numerical method for the 1D hyperbolic conservation law

$$w_t + f(w)_x = 0$$

is *conservative* if it can be written in the form

$$w_i^{n+1} = w_i^n - \frac{\Delta t}{\Delta x} \left( F_{i+\frac{1}{2}}^n - F_{i-\frac{1}{2}}^n \right)$$