Pset 4. Due 6/15/15.

Problem 1: Wave equation.

a) Write down the upwind schemes for the 1D wave equation. Define the ratio: r= c*dt/dx, where c is the wave speed.
b) Write a code to solve the 1D wave equation. Make a graph to show the solution and discuss your results.

- Try r=1.
- Try r<1.
- Try r>1.

Problem 2: Boundary value problem.

a) Consider a 2D Poisson equation in the x-y plane with the periodic boundary condition in the y direction.

b) Find a 2D example with known analytic solution.

c) Write a code to solve the equation.
Hint: use Fourier transform in the y direction to reduce to a 1D problem and then use finite difference in the x direction with fixed-fixed boundary conditions.

d) Make a 2D plot to show your solution and check your results.