## Numerical Experiment (due 06/13/2016)

## Plot @ t = 1, 2, ..., 8

- 1.  $u_t = cu_x + du_{xx}$  (c = 1, d = 0.05) explicit (stable/unstable) and implicit
- 2.  $u_t = iu_{xx}$  (Schrödinger's equation) Stability conditions for explicit and implicit, examples and code
- 3.  $u_t = cu_x$  (c = 1) Use the website code or your own to compare upwind-LF-LW-leapfrog for different  $r = c\Delta t/\Delta x$ . How does the Lax-Wendroff oscillation depend on r? Does the solution from a step function approach a steady profile? What is width of the discrete shock in each method?
- 4.  $u_t = uu_x$  (Conservation law) Write a code to test upwind vs. Lax-Wendroff on examples when shocks or fans form.