1) Modify the Matlab program traffic.m so that, instead of implementing periodic boundary conditions, it evolves the traffic in a finite segment of a road, say between $x = 0$ and $x = 1$. Devise (and explain) boundary conditions corresponding to a traffic light at $x = 1$, alternating between green and red, and a prescribed incoming car flux $Q_0(t)$ at $x = 0$, changing during the day to reflect peak and non-peak hours. Illustrate the resulting phenomena with one or two chosen numerical runs.

2) Solve the Riemann problem for the shallow-water equations corresponding to the dam breaking problem:

$$ h(x, 0) = \begin{cases} h^- & \text{for } x < 0 \\ h^+ < h^- & \text{for } x > 0 \end{cases}, \quad u(x, 0) = 0. $$

Plot the solution at time $t = 1$. 

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Partial Differential Equations I, Spring 2004
Second Assignment (Due Wed. February 11)