Finite Volume Methods

Assignment 6

Problem 1
Consider the DG method with $\Pi_1$ basis functions for the linear advection equation. Write down the discretization for the upwind flux for a fixed mesh width $\Delta x$ when using the monomial basis.

Problem 2
Consider the linear advection equation

$$u_t + u_x = 0, \quad x \in [0, 2], t \in [0, \infty].$$

Discretize this using the explicit Euler method with constant mesh width $\Delta t$ in time and the second order DG method when using the monomial basis with constant mesh width $\Delta x$ in space. As a flux function, use the upwind flux.

Use the following test examples:

a) $u(x, 0) = \sin x, u(0, t) = -\sin t$

Return: Thursday, May 16th, in class