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Sheet 10

Deadline: 22.05.2024, 12:00 PM

Exercise 1 (Points: 10)
Consider the following Riemann problem

$$\boldsymbol{u}_t + A\boldsymbol{u}_x = 0, \quad x \in [-2, 2] \tag{1}$$

with

$$A = \begin{pmatrix} 0 & 4 \\ 1 & 0 \end{pmatrix},$$

and initial data

$$\boldsymbol{u}(x,0) = \begin{cases} (1,1)^\top, & x > 0, \\ (0,1)^\top, & x < 0. \end{cases}$$

(a) Compute the numerical solution by Godunov scheme at $t = 1$ with $N = 100$.

(b) Compute the numerical solution by the Godunov scheme with the minmod, superbee and MC limiters, respectively, at $t = 1$ with $N = 100$.

Note that the system (1) is prescribed with Neumann zero boundary condition.