Pre-class assignment # 11

Brian O'Shea,
PHY-905-005, Computational Astrophysics and Astrostatistics
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This assignment is due the evening of Wednesday Feb. 15, 2023. Turn in all materials via GitHub.

Reading:

1. Chapter 6 ("Burgers' Equation") of Mike Zingale's Computational Hydrodynamics Tutorial, which you can find in the pre-class assignment for Day 8. Focus on Sections 6.1-6.2, but make sure to read the remainder of the chapter as well (which is only a few pages).

2. Wikipedia page on Burgers' Equation (optional, but the animations are useful to look at).

Your assignment:

1. Extend your code from the previous class to implement the finite volume (i.e., conservative-form) solution to the inviscid Burgers' equation (Eqtn. 6.1 in Zingale) using whichever limiter you implemented in class and Dirichlet boundary conditions. Set up the rarefaction wave initial conditions (shown in Figure 6.4 and described in the text) and the sinusoidal initial conditions (Equation 6.19 and Figure 6.5), and verify that they evolve correctly until the wave hits the boundary of the box.

2. What are at least two questions that you have from the readings that you'd like us to address in class? Put those questions in `ANSWERS.md`.

Handing it in: Include your code, your plots, and your answers to the questions about the readings (in the file `ANSWERS.md`) in your assignment.