CS555.

Questions.

(1) Can you write the following in conservation form?
\[ u_t + x u_x = 0 \]

(2) Can you write the following in conservation form (note 2D)?
\[ u_t + y u_x - x u_y = 0 \]

(3) Consider Burger’s equation:
\[ u_t + u u_x = 0 \]
with initial value:
\[ u_0(x) \]

Draw the characteristic lines. Interpret the behavior.

(4) Consider Burger’s equation:
\[ u_t + u u_x = 0 \]
with initial value:
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Draw the characteristic lines. Interpret the behavior.
(5) Consider the Riemann Problem
\[ u(x, 0) = \begin{cases} 
5 & x \leq 0 \\
1 & x > 0 
\end{cases} \]
for the Burgers equation: \( u_t + (f(u))_x = 0 \). What is the shock speed?

(6) Consider the Riemann Problem
\[ u(x, 0) = \begin{cases} 
3 & x \leq 0 \\
-1 & x > 0 
\end{cases} \]
for the Burgers equation: \( u_t + (f(u))_x = 0 \). What is the shock speed?

(7) Consider the Riemann Problem
\[ u(x, 0) = \begin{cases} 
2 & x \leq 0 \\
8 & x > 0 
\end{cases} \]
for the Burgers equation: \( u_t + (f(u))_x = 0 \). What is the shock speed?