

Name and Last name: \_\_\_\_\_

1. Explain why a given system of equations:  $\begin{cases} \frac{\partial u_1}{\partial t} + 2\frac{\partial u_1}{\partial x} + \frac{\partial u_2}{\partial x} = 0 \\ \frac{\partial u_2}{\partial t} + 6\frac{\partial u_1}{\partial x} + 4\frac{\partial u_2}{\partial x} = 0 \end{cases}$ ,  
is hyperbolic or not?
2. Calculate time and position at which discontinuity appears  
$$\begin{cases} \frac{\partial U}{\partial t} + \frac{\partial}{\partial x}(-2u^2) = 0 \\ U(x, t = 0) = \begin{cases} 1 & |x| > 2 \\ x + 3 & x \in < -2, -1 > \\ 2 & x \in < -1, 1 > \\ -x + 3 & x \in < 1, 2 > \end{cases} \end{cases}, \quad \boxed{t=}$$
3. For the equation of question 2, draw a solution for  $t = 3$ , assume initial condition:  $U(x, t = 0) = \begin{cases} 1 & |x| > 1 \\ -1 & |x| < 1 \end{cases}$