

# HW1 (incomplete)

September 11, 2024

**Exercise 1** Solve  $\partial_t u + \partial_x u + u = e^{x+2t}$  with initial condition  $u(0, x) = 0$ .

**Exercise 2** Consider the following initial value problem for Burgers equation

$$\begin{cases} \partial_t u + u \partial_x u = 0, \\ u(0, x) = \phi(x) = \begin{cases} 1, & x \leq 0, \\ 1 - x, & 0 < x \leq 1, \\ 0, & x > 1. \end{cases} \end{cases}$$

1. Find the largest time  $t_s$  such that all characteristics do not intersect.
2. Find an expression of  $u(t, x)$  for  $t < t_s$ .