1. Given the conservation law $u_t + [\cos u]_x = 0$, sketch the characteristic curves, where

   (a)

$$u(x,0) = \begin{cases} \frac{\pi}{2} & x < 0 \\ 0 & x \geq 0 \end{cases} \tag{1}$$

   (b)

$$u(x,0) = \begin{cases} \frac{\pi}{6} & x < 0 \\ \frac{\pi}{2} & x \geq 0 \end{cases} \tag{2}$$

2. Solve the following equations using the method of characteristics

   (a) $u_t + 7u_x = t \quad u(x,0) = \sin x$

   (b) $u_t + xu_x + 2u = 0 \quad u(x,0) = x^3$

   (c) $u_t + 2xtu_x = u \quad u(x,0) = 1 - x$

   (d) $tu_t + 2xu_x = t\sin(\pi t) \quad u(x,1) = \cos x$