1. Solve the following initial-value problems using the method of characteristics.
   (a) $u_x + u_y = u^2, \quad u(x, 0) = x.$
   (b) $(u + y)u_x + u_y = -u, \quad u(x, 0) = x.$

2. Solve the following Cauchy problems using the method of characteristics.
   (a) $xu_x - xu_y = u - 1, \quad u(x, x^2) = x^3 + x^2 + 1.$
   (b) $uu_x + u_y = 2, \quad u(x, x) = x.$

3. Is it possible to solve the problem

   $$u_x + u_y = 0, \quad u(x, x) = 2$$

   using characteristics? Solve it or explain why you can't.