# Introduction to PDEs 2018, tenth assignment, due Monday December 3rd

**1)** Pose three Cauchy problems for the equation

$$u_x + \sin(x) u_y = 1,$$

one with a unique solution, one with none and one with infinitely many.

**2)** Consider the equation

$$(1 - \cos(x))\, u_{tt} - u_{xt} - u_{xx} = 0,$$

with Cauchy data

$$u(x,0) = f(x)\,, \qquad u_t(x,0) = g(x), \qquad f, g \in C^2.$$

What compatibility condition do $f$ and $g$ have to satisfy for this problem to have a $C^2$ solution in a neighborhood of $t = 0$?