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PARTIAL DIFFERENTIAL EQUATIONS I
TUTORIAL SHEET 12

WS 2016/17
January 25, 2017

T 1. Use the methode of characteristics to determine the solution $u : \mathbb{R} \times \mathbb{R}^+ \rightarrow \mathbb{R}$ of the initial value problem

$$\begin{cases} (y+u)u_x + yu_y = x - y & \text{in } \mathbb{R} \times \mathbb{R}^+ \\ u(x, 1) = 1 + x & \text{for all } x \in \mathbb{R} \end{cases}$$

T 2. Use the methode of characteristics to determine the solution $u : \mathbb{R} \times [0, \infty) \rightarrow \mathbb{R}$ of the initial value problem

$$\begin{cases} u_t(x, t) - xu_x(x, t) = x & \text{in } \mathbb{R} \times (0, \infty) \\ u(\cdot, 0) = f & \text{in } \mathbb{R}, \end{cases}$$

with $f \in C^1(\mathbb{R})$.