

2024-2025 冬学期偏微分方程王伟老师小测

一. (10 分) 用行波法求解定解问题:

$$\begin{cases} u_{xx} + 2 \sin x \cdot u_{xy} - \cos^2 x \cdot u_{yy} + \cos x \cdot u_y = 12x^2, & x, y \in \mathbb{R}, \\ u|_{y=-\cos x} = x, \\ u_y|_{y=-\cos x} = 0. \end{cases}$$

二. (10 分) 用分离变量法求解定解问题:

$$\begin{cases} \frac{\partial^2 u}{\partial t^2} + 2 \frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}, & 0 < x < 1, t > 0 \\ u|_{x=0} = \frac{\partial u}{\partial x} \Big|_{x=1} = 0, \\ u|_{t=0} = x(x-1)^2, \quad \frac{\partial u}{\partial t} \Big|_{t=0} = 0. \end{cases}$$