

## Homework 2

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- Solve the PDE

$$\begin{aligned}u_t + v_0 u_x &= 0 \\ u(x, 0) &= e^{-x^2/2}\end{aligned}$$

What is the integral of  $u(x, t)$  over the real axis (from  $x = -\infty$  to  $x = +\infty$ )? Why is it constant?

- Solve the PDE

$$\begin{aligned}u_t + x u_x &= -u \\ u(x, 0) &= e^{-x^2/2}\end{aligned}$$

- Solve the PDE

$$\begin{aligned}u_t + x u_x &= e^u \\ u(x, 0) &= x^2\end{aligned}$$

- Textbook exercises on linear and semilinear equations: (page 58-59) 2.1, 2.2, 2.3, 2.4, 2.7
  - Textbook exercises on quasilinear equations: (page 60-61) 2.12, 2.16, 2.18
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