Homework 2

- Solve the PDE

$$u_t + v_0 u_x = 0$$
$$u(x, 0) = e^{-x^2/2}$$

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

$$u_t + x u_x = -u$$
$$u(x, 0) = e^{-x^2/2}$$

- Solve the PDE

$$u_t + x u_x = e^u$$
$$u(x, 0) = x^2$$

- 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, 2.17