

Exercise 2

For a solution $u(x, t)$ of the wave equation with $\rho = T = c = 1$, the energy density is defined as $e = \frac{1}{2}(u_t^2 + u_x^2)$ and the momentum density as $p = u_t u_x$.

- (a) Show that $\partial e / \partial t = \partial p / \partial x$ and $\partial p / \partial t = \partial e / \partial x$.
- (b) Show that both $e(x, t)$ and $p(x, t)$ also satisfy the wave equation.