

## Exercise 11

- (a) Consider the diffusion equation on the whole line with the usual initial condition  $u(x, 0) = \phi(x)$ . If  $\phi(x)$  is an *odd* function, show that the solution  $u(x, t)$  is also an *odd* function of  $x$ . (*Hint*: Consider  $u(-x, t) + u(x, t)$  and use the uniqueness.)
- (b) Show that the same is true if “odd” is replaced by “even.”
- (c) Show that the analogous statements are true for the wave equation.