

**Exercise 2**

Consider a traveling wave  $u(x, t) = f(x - at)$  where  $f$  is a given function of one variable.

- (a) If it is a solution of the wave equation, show that the speed must be  $a \pm c$  (unless  $f$  is a linear function).
- (b) If it is a solution of the diffusion equation, find  $f$  and show that the speed  $a$  is arbitrary.