

Homework assigned in class

1) Consider the equation,

$$\frac{\partial^2 U}{\partial t^2} = \frac{\partial^2 U}{\partial x^2} + \delta\left(t - \frac{x}{v}\right),$$

with initial conditions, $U(0, t) = 0 = U_t(0, t)$, and boundary conditions, $U(x, 0) = 0$, and $\lim_{x \rightarrow \infty} U(x, t) = 0$.

a) Solve the above equation for $v \neq 1$ and $v = 1$.

b) Plot the solution for $t = 6$ and all x for $v > 1$, $v < 1$ and $v = 1$.

c) Plot the solution for $x = 6$ and all t for $v > 1$, $v < 1$ and $v = 1$.

What are the solutions telling you physically?

2) Show that the solution obtained in section 46 obeys the initial conditions and boundary conditions, i.e. equations (2) and (3) on page 145.