

Math 1500 Bonus question

Hand in before the final exam to get bonus marks!

1. Solve the following wave equation,

$$\begin{cases} u_{tt} = 2u_{xx} \\ u(-1, t) = 0, \quad u(1, t) = 0 \\ u(x, 0) = 1 - |x|, \quad u_t(x, 0) = 0. \end{cases}$$

2. Graph the resulting solution for $t \in [0, 10]$. You may use the computer to do that [or if your computer is broken, you can think harder and do it by hand!]
3. You will find there is some T such that $u(x, T) = u(x, 0)$. What is the first such T ? [give an exact value, not a computer estimate].
4. Repeat questions 1 to 3 but with initial conditions

$$u(x, 0) = 0, \quad u_t(x, 0) = 1 - |x|.$$