Prob. 1
Solve the following problem

\[
\begin{cases}
    a^2 \frac{\partial^2 u}{\partial x^2} = \frac{\partial^2 u}{\partial t^2}, & 0 < x < L, \ t > 0 \\
    u(0,t) = 0, \ u(1,t) = 0 \\
    u(x,0) = 0, \ \frac{\partial u}{\partial t} \bigg|_{t=0} = x(L - x)
\end{cases}
\]