Homework 6

Solve the wave equation

$$\frac{\partial^2 u}{\partial t^2} = 4\frac{\partial^2 u}{\partial x^2}\,, \qquad x \geq 0\,, \quad t \geq 0\,,$$

subject to the boundary condition

$$u(0,t) = g(t)\,,$$

and the initial conditions

$$u(x,0) = f(x)\,,$$
$$\frac{\partial u}{\partial t}(x,0) = 0\,.$$

Also, assume that $g(0) = f(0) = 0$.

[Hint: the problem has a surprisingly simple solution, but finding it can be tricky. If you find the problem too hard, you are allowed to simplify it by considering $g(t) = \sin(2t)$.]

To be handed in before 5 p.m., May 19.