(1) Solve the boundary-value problem
\[ k \frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial t}, 0 < x < 2, t > 0 \]
\[ u(0, t) = 0, u(2, t) = 0, t > 0 \]
\[ u(x, 0) = 2x^2, \quad 0 < x < 2. \]