1 (20 points) Use Laplace transform to solve the problem
\[
\frac{\partial^2 u}{\partial x^2} = \frac{\partial^2 u}{\partial t^2}, \quad x > 0, \quad t > 0,
\]
subject to the boundary and initial conditions
\[
\begin{align*}
    u(0,t) &= 1, \quad \lim_{x \to \infty} \frac{\partial u}{\partial x} = 0, \quad t > 0, \\
    u(x,0) &= e^{x} - x, \quad \left| \frac{\partial u}{\partial t} \right|_{t=0} = 0, \quad x > 0.
\end{align*}
\]
2 (04 points) Solve the problem using the Fourier sine transform

\[ \frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial t}, \quad x > 0, \; t > 0, \]

\[ u(0, t) = 2, \; t > 0, \quad u(x, 0) = 0, \; x > 0. \]