Wave Initial Conditions

This function describes the displacement of a stretched string from its equilibrium position at $t = 0$. Consider only the portion of the string between x = 0 and L, and find the function that describes its displacement at ALL times. (Hint - this is not a single-wavelength/single frequency problem.)

1. Initial conditions: $\psi(x, t = 0) = A \sin\left(\frac{\pi x}{L}\right)\left(1 + \cos\left(\frac{\pi x}{L}\right)\right)$ $\frac{\partial \psi(x, t=0)}{\partial t}$

2. Boundary conditions: $\psi(x = 0, t) = 0$ $\psi(x = L, t) = 0$