The function $\psi(x,t)$ describes the displacement of a stretched string from its equilibrium position. 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:** $\psi(x,t = 0) = A \sin \left( \frac{\pi x}{L} \right) \left( 1 + \cos \left( \frac{\pi x}{L} \right) \right) \frac{\partial \psi(x,t = 0)}{\partial t} = 0$

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