1. Use Laplace transforms to solve the initial value problem
   \[ x'' + 6x' + 25x = t^2, \quad x(0) = 1, \quad x'(0) = 2. \]

2. Let \( f(t) \) be the “impulse train” \( f(t) = \delta(t) + \delta(t - \pi) + \delta(t - 2\pi) + \cdots \). Find the Laplace transform of the solution to the initial value problem
   \[ x'' + 4x = f(t), \quad x(0) = 0, \quad x'(0) = 0. \]
   Show that the Laplace transform of the solution has a double pole on the imaginary axis, which suggests (but doesn’t prove) the solution will be in resonance. Explain why resonance is reasonable here.