Problem 3 [10 points]
In figure 3, a string, tied to a vibrator at \( P \) and running over a support at \( Q \), is stretched by a block of mass \( m \). The separation \( L \) between \( P \) and \( Q \) is 1.2 m, the linear density of the string is 1.6 g/m, and the frequency \( f \) of the vibrator is fixed at 120 Hz. The amplitude of the motion at \( P \) is small enough for that point to be considered a node. A node also exists at \( Q \).
(a) What mass \( m \) allows the vibrator to set up the fourth harmonic on the string?
(b) What standing wave mode is set up if \( m = 1.00 \) kg.

Problem 4
(a) Sketch the profile of the wave \( y(x, t) = A e^{-B(x-ut)^2} \) at \( t = 0s \) and \( t = 1s \), using \( A = 1.0 \) m, \( B = 1.0 \) m\(^{-2} \) and \( v = 2.0 \) m/s.
(b) Verify by partial differentiation, that the wave function of part (a) satisfies the one-dimensional wave equation.