1. A system undergoes simple harmonic motion and follows an equation
\[ x = A \cos(\omega t + \varphi) \] where \( A = 24 \text{ cm} \), \( \omega = \pi/3 \text{ rad/s} \) and \( \varphi = \pi \text{ rad} \).
(a) What is the amplitude of the motion? the angular frequency? the phase angle?
(b) What is the period of the motion?
(c) If the mass of the moving part of the system is 4 kg, what is the constant, \( k \), of the system?
(d) If I increase the amplitude of the motion by a factor of 2, how will this affect the period of the motion?

2. A transverse sinusoidal traveling wave shown below at a certain time, \( t \), moves according to the equation \[ y = A \cos(kx - \omega t) \]. Find the amplitude, wavelength, wave number, angular frequency, period, and velocity of the wave if the frequency is 2.00 Hz.

3. A 2.20-kg mass oscillates on a spring of force constant 250.0 N/m with a period of 0.615 s.
(a) Is the system damped or not? How do you know? If it is damped, find the damping constant \( b \).
(b) Is the system undamped, underdamped, critically damped, or overdamped? How do you know?