Problem: Given a transverse sine wave

where $y(x,t) = A\sin(kx - \omega t)$

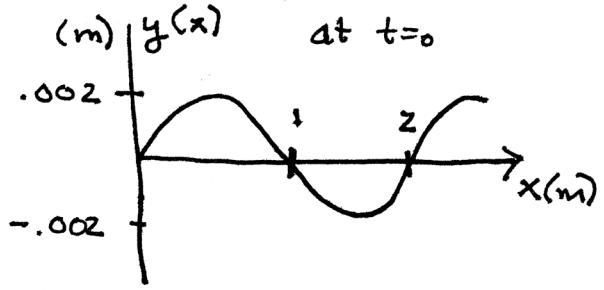
Let $y(0,0) = 0$

$A = 2\text{ mm}$

$\lambda = 2\text{ m}$

$v = 40\text{ m/s}$

$\Rightarrow$



A) Find f, ω, k $\quad v = \lambda f \Rightarrow f = \frac{40\text{ m/s}}{2\text{ m}} = 20\text{ Hz}$

$\omega = 2\pi f = 40\pi\ s^{-1} \qquad k = \frac{2\pi}{\lambda} = \frac{2\pi}{2\text{ m}} = \pi\ m^{-1}$

B) $y(x,t) = .002\sin\pi(x - 40t)\ m$

C) What is v_y^{MAX}?

$v_y = \frac{dy}{dt} = -A\omega\cos(kx - \omega t)$

$\Rightarrow v_y^{MAX} = A\omega = (.002\text{ m})(40\pi\ s^{-1}) = 80\pi \times 10^{-3}\ \frac{m}{s}$

D) What is a_y^{MAX}? $\Rightarrow a_y = \frac{dv_y}{dt} = -A\omega^2\sin(kx - \omega t)$

$a_y^{MAX} = A\omega^2 = (.002\text{ m})(40\pi\ s^{-1})^2 = 3.2\pi^2\ \frac{m}{s^2}$