SECOND MIDTERM
Name (print) __________________________ Name (signed) __________________________

Discussion Instructor (circle): Brown Chakhbazian Condella Portnoi Zhukov

Discussion Section # __________

REPORT ALL NUMBERS TO THREE SIGNIFICANT FIGURES!
Use the conversion constants and data given on the front page.

A traveling wave is described by the function

\[ y = (2.45 \text{ mm}) \cos \left( 62.5x + 7520t - \frac{\pi}{3} \right) \]

Except where shown, lengths are in meters. Other quantities are in the usual appropriate units.

(a) Calculate the magnitude of the velocity of the wave.
\[ v = \frac{\omega}{k} = -7520/62.5 \Rightarrow \left| v \right| = 120.3 \text{ (m/s)} \]

(b) Calculate the transverse velocity at \( t = 10.0 \text{ s} \) and \( x = 0 \).
\[ v_t = -2.45 \times 10^{-3} \times 7.52 \times 10^3 \sin(75200 - \pi/3) = -17.98 \text{ (m/s)} \]

(c) Calculate the wavelength.
\[ 2\pi/\lambda = 62.5 \Rightarrow \lambda = \frac{2\pi}{62.5} = 0.1005 \text{ (m)} \]

(d) Calculate the frequency in Hertz.
\[ 2\pi f = 7520 \Rightarrow f = \frac{7520}{2\pi} = 1197 \text{ (Hz)} \]

(e) Calculate the first value of the time, \( t \), for \( t > 0 \) such that a positive peak of the wave is at \( x = 0 \).
\[ 7520t - \pi/3 = 0 \Rightarrow t = \frac{\pi/3}{7520} \approx 1.39 \times 10^{-7} \text{ (s)} \]