a) Write an equation describing a sinusoidal transverse wave traveling on a cord in the +x direction with a wavelength of 10 cm, a frequency of 400 Hz, and an amplitude of 2.0 cm.

\[ y(t) = y_m \sin \left( \frac{2\pi}{\lambda} x - \omega t \right) \]

\[ k = \frac{2\pi}{\lambda} \quad \text{cm}^{-1} \approx 6.28 \text{ cm}^{-1} \]

\[ \omega = 2\pi f \quad \text{Hz} \]

\[ \lambda = 10 \text{ cm} \quad f = 400 \text{ Hz} \]

\[ k = \frac{2\pi}{\lambda} \approx 6.28 \text{ cm}^{-1} \]

\[ \omega = 2\pi \times 400 = 2510 \text{ rad/s} \]

b) What is the maximum speed of a point on the cord?

Maximum speed is the transverse maximum speed

\[ v_m = \omega y_m = 2510 \times 2.0 \text{ cm/s} \]

\[ = 5020 \text{ cm/s} = 16\pi \text{ m/s} \]

c) What is the speed of the wave?

\[ v = \lambda f \text{ is the speed of the wave} \]

\[ v = 10 \text{ cm} \cdot 400 \text{ Hz} = 4000 \text{ cm/s} \]

\[ = 40 \text{ m/s} \]