7. (a) We write the expression for the displacement in the form $y(x,t) = y_m \sin(kx - \omega t)$. A negative sign is used before the ωt term in the argument of the sine function because the wave is traveling in the positive x direction. The angular wave number k is $k = 2\pi/\lambda = 2\pi/(0.10\,\mathrm{m}) = 62.8\,\mathrm{m}^{-1}$ and the angular frequency is $\omega = 2\pi f = 2\pi(400\,\mathrm{Hz}) = 2510\,\mathrm{rad/s}$. Here λ is the wavelength and f is the frequency. The amplitude is $y_m = 2.0\,\mathrm{cm}$. Thus

$$y(x,t) = (2.0\,\mathrm{cm}) \sin\left(\left(62.8\,\mathrm{m}^{-1}\right) x - \left(2510\,\mathrm{s}^{-1}\right) t\right) \ .$$

(b) The (transverse) speed of a point on the cord is given by taking the derivative of y:

$$u(x,t) = \frac{\partial y}{\partial t} = -\omega y_m \cos(kx - \omega t)$$

which leads to a maximum speed of $u_m = \omega y_m = (2510\,\mathrm{rad/s})(0.020\,\mathrm{m}) = 50\,\mathrm{m/s}$.

(c) The speed of the wave is

$$v = \frac{\lambda}{T} = \frac{\omega}{k} = \frac{2510\,\mathrm{rad/s}}{62.8\,\mathrm{m}^{-1}} = 40\ \mathrm{m/s}\ .$$