PPP

5-16

$$y = (3\text{cm}) \sin\left(\frac{\pi x}{10\text{cm}}\right) \cos\left(\frac{50\pi}{s} t\right)$$

ser ut som stående våg.

Sid 120 i boken ger

$$E_1 = E_0 \sin(kx + \omega t)$$

$$E_2 = E_0 \sin(kx - \omega t - \varphi_R)$$

ger $E_R = 2E_0 \cos\left(kx + \frac{\varphi_R}{2}\right) \sin\left(\omega t - \frac{\varphi_R}{2}\right)$

Läs av:

$$\begin{cases} 2E_0 = 3\text{cm} \Rightarrow E_0 = 1{,}5\text{cm} \\ k = \frac{\pi}{10\text{cm}} \\ \frac{\varphi_R}{2} = \frac{\pi}{2} \Rightarrow \varphi_R = \pi \\ \frac{50\pi}{1s} = \omega \end{cases}$$

Amplitude $E_0 = 1{,}5$ cm Våglängd $\lambda = \frac{2\pi}{k} = 20$ cm

Fart $v_f = \frac{\omega}{k} = \frac{50\pi}{1s} \cdot \frac{10\text{cm}}{\pi} = 500\ \text{cm/s} = 5\ \text{m/s}$

b) Avst mellan noderna $= \frac{\lambda}{2} = 10\text{cm}$

c) $y = 3\text{cm} \sin\left(\frac{\pi \cdot 5}{10}\right) \cdot \cos(50\pi \cdot 0{,}77) = 3\text{cm} \cdot 1 \cdot (-1) = -3\text{cm}$

$$v = \frac{dy}{dt} = 3\text{cm} \cdot \frac{50\pi}{1s} \cdot \sin\frac{\pi}{2}(-\sin 11\pi) = 0$$

$$a = \frac{d^2y}{dt^2} = 3\text{cm} \cdot \left(\frac{50\pi}{1s}\right)^2 \sin\frac{\pi}{2}(-\cos 11\pi) = +3 \cdot (50\pi)^2\ \text{cm/s}^2$$

$$= 740\ \text{m/s}$$