TUTORIALS ON WAVE OPTICS

EXERCISE 1

Consider the red wave shown in Fig. E1.1. What is the wave's (a) amplitude, (b) wavelength, and (c) frequency, given that its phase velocity is 6 m/s?
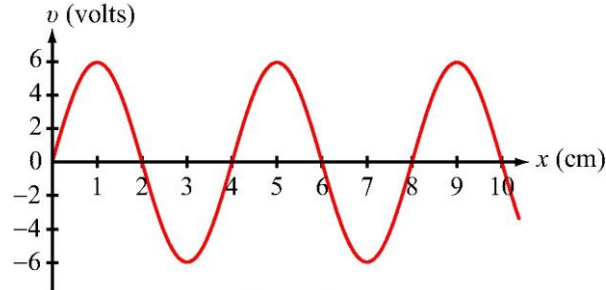

Figure E1.1

EXERCISE 2

The wave shown in red in Fig. E1.2 is given by $\upsilon = 5\cos2\pi t/8$. Of the following four equations:

(1) $\upsilon = 5\cos(2\pi t/8 - \pi/4)$,

(2) $\upsilon = 5\cos(2\pi t/8 + \pi/4)$,

(3) $\upsilon = -5\cos(2\pi t/8 - \pi/4)$,

(4) $\upsilon = 5\sin2\pi t/8$,

(a) which equation applies to the green wave? (b) which equation applies to the blue wave?
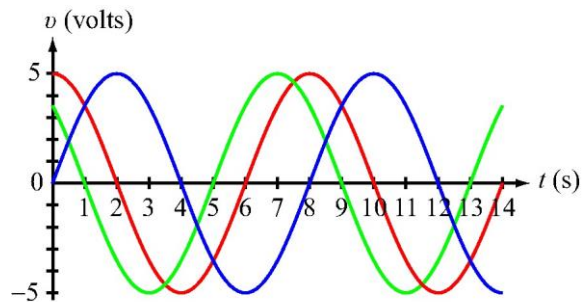

Figure E1.2

. EXERCISE 3

The electric field of a traveling electromagnetic wave is given by

$$E(z,t) = 10\cos(\pi \times 10^7 t + \pi z/15 + \pi/6) \qquad \text{(V/m)}.$$

Determine (a) the direction of wave propagation, (b) the wave frequency f, (c) its wavelength λ, and (d) its phase velocity u_p.

EXERCISE 4

Consider the red wave shown in Fig. E1.4. What is the wave's (a) amplitude (at $x = 0$), (b) wavelength, and (c) attenuation constant?
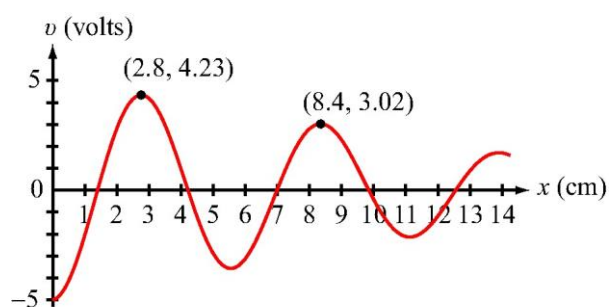

Figure E1.4

EXERCISE 5

The red wave shown in Fig. E1.5 is given by $v = 5\cos 4\pi x$ (V). What expression is applicable to (a) the blue wave and (b) the green wave?
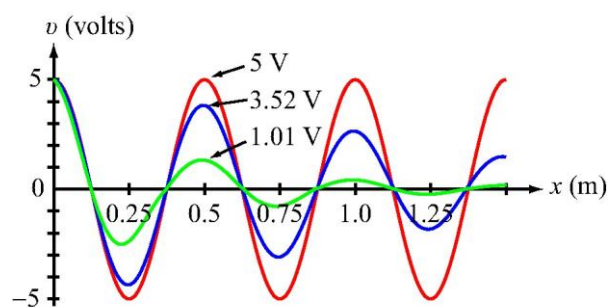

Figure E1.5