

$$1) a) f = \frac{v}{\lambda}$$

$$= \frac{8 \text{ m/s}}{0.32 \text{ m}}$$

$$f = 25 \text{ Hz}$$

$$b) T = \frac{1}{f}$$

$$= \frac{1}{25}$$

$$T = 0.04 \text{ s}$$

$$c) \omega = 2\pi f$$

$$= 2\pi 25$$

$$\omega = 50\pi$$

$$k = \frac{2\pi}{\lambda}$$

$$= \frac{2\pi}{0.32}$$

$$k = 19.6$$

$$d) y(x, t) = A \sin[kx - \omega t]$$

$$y(x, t) = 0.07 \sin[19.6x - 50\pi t]$$

$$e) y(x=0.36, t=0.15) = 0.07 \sin(19.6(0.36) - 50\pi(0.15))$$

$$2) b) \lambda = \frac{2\pi}{0.28}$$

$$\lambda = \frac{2\pi}{k}$$

$$= \frac{2\pi}{\frac{2\pi}{0.28}}$$

$$= \frac{2\pi}{1} \cdot \frac{0.28}{2\pi}$$

$$\lambda = 0.28$$

$$c) \omega = \frac{2\pi}{0.04}$$

$$\omega = 2\pi f$$

$$f = \frac{\omega}{2\pi}$$

$$= \frac{\frac{2\pi}{0.04}}{2\pi}$$

$$= \frac{2\pi}{0.04} \cdot \frac{1}{2\pi}$$

$$f = \frac{1}{0.04}$$

$$f = 25 \text{ Hz}$$

$$d) v = \omega / k$$

$$= \frac{\frac{2\pi}{0.04}}{\frac{2\pi}{0.28}}$$

$$= \frac{2\pi}{0.04} \cdot \frac{0.28}{2\pi}$$

$$v = 7 \text{ m/s}$$

3) a)

$$y(x, t) = A \cos \left[ \frac{2\pi}{\lambda} (x - vt) \right]$$

$$v(x, t) = \frac{d}{dt} y(x, t)$$

$$v(x, t) = \frac{2\pi}{\lambda} A v \sin \left[ \frac{2\pi}{\lambda} (x - vt) \right]$$

$$b) v_{\max} = \frac{2\pi}{\lambda} A v \sin \left[ \frac{2\pi}{\lambda} (x - vt) \right]$$

$$|v_{\max}| = \frac{2\pi}{\lambda} A v$$

4)

$$f = 1.5 \text{ kHz}$$

$$V_s = \frac{1}{2} (340 \text{ m/s})$$

$$a) \quad f' = f \frac{V \pm V_o}{V \mp V_s}$$

$$b) \quad 1.5 \text{ kHz} \left( \frac{340 + 170}{340} \right)$$

$$\frac{1.5 \text{ kHz} \cdot 340}{340 - 170}$$

$$f' = 2.25 \text{ kHz}$$

$$f' = 3 \text{ kHz}$$

$$5) \quad v_s = 38 \text{ m/s}$$

$$f = 352 \text{ Hz}$$

$$a) \quad f' = f \frac{v \pm v_o}{v \mp v_s}$$

$$v_o = 18 \text{ m/s}$$

$$f' = 352 \text{ Hz} \left( \frac{340 + 18}{340 - 38} \right)$$

$$f' = 406 \text{ Hz}$$

$$b) \quad f' = 352 \text{ Hz} \left( \frac{340 - 18}{340 + 38} \right)$$

$$f' = 307 \text{ Hz}$$

6)

$$b) f' = \left( \frac{v}{v - v_c} \right) \left( \frac{v + v_c}{v} \right) 1235$$

$$1255 = \left( \frac{344}{344 - v_c} \right) \left( \frac{244 + v_c}{344} \right) 1235$$

$$v_c = 2.76$$

$$c) ? = \left( \frac{344 + 20}{344 - 2.76} \right) \left( \frac{244 + 2.76}{344 - 20} \right) 1235$$

$$f' = 1410 \text{ Hz}$$