

# LATEX PRACTICE

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(31) a. Normalization

$$\psi(x) = A \cos \alpha x, -\frac{\pi}{2\alpha} \leq x \leq \frac{\pi}{2\alpha}$$

$$\int_a^b |\psi(x)|^2 dx = 1$$

$$\int_{-\frac{\pi}{2\alpha}}^{\frac{\pi}{2\alpha}} |A \cos \alpha x|^2 dx = 1$$

$$A^2 \int_{-\frac{\pi}{2\alpha}}^{\frac{\pi}{2\alpha}} \cos^2 \alpha x dx = 1$$

$$\frac{A^2}{\alpha} \left[ \frac{u}{2} + \frac{\sin 2u}{4} \right]_{\mathbf{0}}^{\mathbf{0.5 \times 10^{-10} m}}$$

$$\frac{\left(\sqrt{\frac{2\alpha}{\pi}}\right)^2}{\alpha} \left[ \frac{u}{2} + \frac{\sin 2u}{4} \right]_{\mathbf{0}}^{\mathbf{0.5 \times 10^{-10} m}}$$

$$\frac{\left(\frac{2\alpha}{\pi}\right)}{\alpha} \left[ \frac{u}{2} + \frac{\sin 2u}{4} \right]_{\mathbf{0}}^{\mathbf{0.5 \times 10^{-10} m}}$$

$$\frac{2}{\pi} \left[ \left( \frac{0.5 \times 10^{-10} \text{m}}{2} + \frac{\sin(2(0.5 \times 10^{-10} \text{m}))}{4} \right) - \left( \frac{0}{2} + \frac{\sin(2(0))}{4} \right) \right]_{\mathbf{0}}^{\mathbf{0.5 \times 10^{-10} m}}$$

$$\frac{2}{\pi} \left( \frac{0.5 \times 10^{-10} \text{m}}{2} + \frac{\sin(2(0.5 \times 10^{-10} \text{m}))}{4} \right)$$

(62)

$$k = 1.13 \times 10^3 \frac{\text{N}}{\text{m}}$$

$$m = 1.67 \times 10^{-27} \text{ kg}$$

a. Find f

$$w = \sqrt{\frac{k}{m}} = 2\pi f$$

$$f = \frac{\sqrt{\frac{k}{m}}}{2\pi}$$

$$f = \frac{\sqrt{\frac{(1.13 \times 10^3 \frac{\text{N}}{\text{m}})}{(1.67 \times 10^{-27} \text{ kg} \cdot 2)}}}{2\pi}$$

$$f = 1.851 \times 10^{14} \text{ Hz}$$

b. Find  $E$  and  $\lambda$

$$\Delta E_{43} = hf$$

$$\Delta E_{43} = (6.626 \times 10^{-34} \text{ Js}) (1.851 \times 10^{14} \text{ Hz})$$

$$\Delta E_{43} = 1.227 \times 10^{-19} \text{ J}$$

$$\lambda = \frac{v}{f}$$

$$\lambda = \frac{3.00 \times 10^8 \frac{\text{m}}{\text{s}}}{1.851 \times 10^{14} \text{ Hz}}$$

$$\lambda = 1.621 \times 10^{-6} \text{ m}$$