

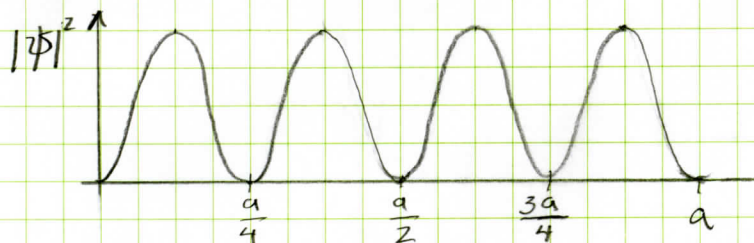
- 7.31) FOR THE 3<sup>RD</sup> EXCITED STATE,  $n=4$
- WRITE DOWN AND SKETCH THE PROBABILITY DISTRIBUTION
  - FIND  $x_{mp}$
  - FIND PROBABILITY FOR FINDING PARTICLE IN  $[0.50a - 0.51a]$  &  $[0.75a - 0.76a]$

FOLLOWING EXAMPLE 7.3, p 221, APPLY (7.60) WITH  $n=4$

$$a) \quad \psi(x) = \sqrt{\frac{2}{a}} \sin\left(\frac{n\pi x}{a}\right) \quad (7.60)$$

$$\Rightarrow \left| \psi(x) \right|^2 = \frac{2}{a} \sin^2\left(\frac{4\pi x}{a}\right)$$

WHICH LOOKS LIKE



- b) BY INSPECTION, THERE ARE EQUAL MAXIMA AT

$$x_{mp} = \frac{a}{8}, \frac{3a}{8}, \frac{5a}{8}, \frac{7a}{8}$$

- c) USING THE APPROXIMATION (7.63)

$$\begin{aligned} P(0.50a \leq x \leq 0.51a) &\approx \left| \psi(0.50a) \right|^2 \Delta x \\ &\approx \frac{2}{a} \sin^2 \left[ \frac{4\pi}{a} (0.50a) \right] (0.01) \\ &\approx \frac{2}{a} \sin^2 [2\pi] = 0 \text{ ZERO!} \end{aligned}$$

$$\begin{aligned} P(0.75a \leq x \leq 0.76a) &\approx \frac{2}{a} \sin^2 \left[ \frac{4\pi}{a} (0.75a) \right] (0.01) \\ &\approx \frac{2}{a} \sin^2 [3\pi] = 0 \text{ ZERO!} \end{aligned}$$

BOTH ARE ZERO AS PREDICTED BY THE PLOT.