

Problem Set 3

1 Given a wavefunction: $\Psi(x) = 2e^{-2x}$ **evaluate the integral:** $\int_0^{\infty} \Psi^2(x) dx$

2. Given a wavefunction: $\Psi(x) = \frac{1}{\sqrt{\pi}} \cos(x)$ **evaluate the integral:** $\int_0^{2\pi} \Psi^2(x) dx$.

Hint: $\cos^2(x) = \frac{1}{2}(1 + \cos(2x))$

3. Find a value of A if $A^2 \int_0^L \sin^2\left(\frac{\pi x}{L}\right) dx = 1$, **where** $L = \text{const} \neq 0$

Hint: $\sin^2(x) = \frac{1}{2}(1 - \cos(2x))$