5.73

Quiz 1

A is a complex number $\quad A \equiv a + ib$ (a and b are real)
$A^* \equiv a - ib$
$\lvert A\rvert^2 = AA^*$
Re A means real part of A: Re A = a
Im A means imaginary part of A: Im A = b
$e^x = \cos x + i\sin x$

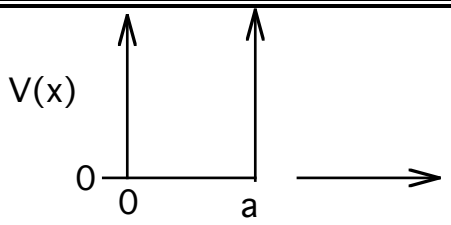
A. $A = 4 + i3$. Evaluate $|A|^2$.

B. What is $\mathrm{Im}[(4 + i3)\, e^{i2x}]$?.

C. $|(4 + i3)e^{i2x}|^2$.

2.

The energies and eigenfunctions for



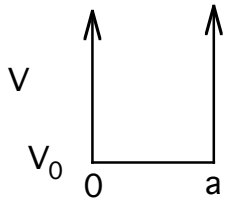
are $E_n = n^2\left[\frac{h^2}{8ma^2}\right]$ $n = 1,2,\ldots\infty$

$$\psi_n = \left(\frac{2}{a}\right)^{1/2}\sin(n\pi x)$$

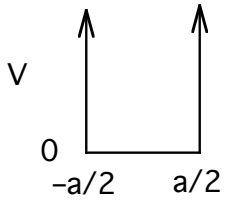
A. Which eigenstates (even n or odd n) have a node at $x = a/2$?

B. There is one internal node in ψ_2. How many internal nodes are there in $\psi_{13}(x)$?

C. Do the eigenfunctions, $\{\psi_n\}$, change if the potential is shifted up by V_0? Why?



D. Is there any change in the energy levels, $\{E_n\}$, if the potential is shifted to the left by a/2?



5.73 Quantum Mechanics I
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