


Print view of 'WaveFuncProbPretest'

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Please type your CU userid:

For questions 1 and 2 below, you are given a particular (physically reasonable) quantum mechanical wave function, $\Psi(x,t)$, of the very specific form, $\Psi(x,t) = f(x) e^{i c t}$ where $f(x)$ is a real function of x and c is a real constant.

Q1:

a) Is the "expectation value of x ", $\langle x \rangle$, real?

- ☒ Select one...
- ☐ Definitely yes, at all times t
- ☐ Definitely yes at $t = 0$, but at other times it depends (not enough information)
- ☐ It depends for any time, even $t = 0$
- ☐ No, at no time will it ever be real

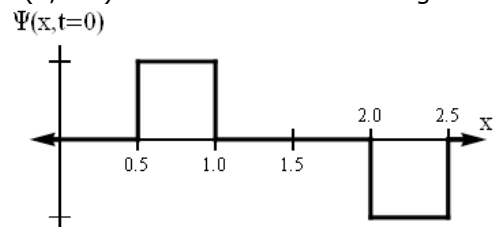
b) Explain your answer:

Q2: a) What, if anything, can we say about the sign of $\langle x \rangle$ at time $t=0$?

- ☒ Select one...
- ☐ It must be positive.
- ☐ It could be positive or 0, but it cannot be negative.
- ☐ It just depends (not enough information).
- ☐ It could be complex, so the sign is not mathematically well-defined.

b) Explain your answer:

The next two questions, refer to the normalized wave function, $\Psi(x,t=0)$ which is shown at the right.



Q3: a) What, if anything, can we say about $\langle x \rangle$?

- ☒ Select one...
- ☐ It must be zero.

- ☐ It must be positive.
- ☐ It depends on the size of the peaks.
- ☐ It is not well defined because the wave function is not always positive.

b) Explain your answer:

Q4: a) What, if anything can we say about the standard deviation of x , σ_x ?

- ☒ Select one...
- ☐ It is exactly zero.
- ☐ It must be less than 1.
- ☐ It must be greater than 1.
- ☐ It is not well defined.

b) Explain your answer:

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