For a particle in a stationary state in the HO, the real and imaginary parts of the wavefunction

A) don't change with time

B) move left to right and back

C) oscillate up and down in phase with each other

D) oscillate up and down 180° out of phase with each other

E) oscillate up and down 90° out of phase with each other

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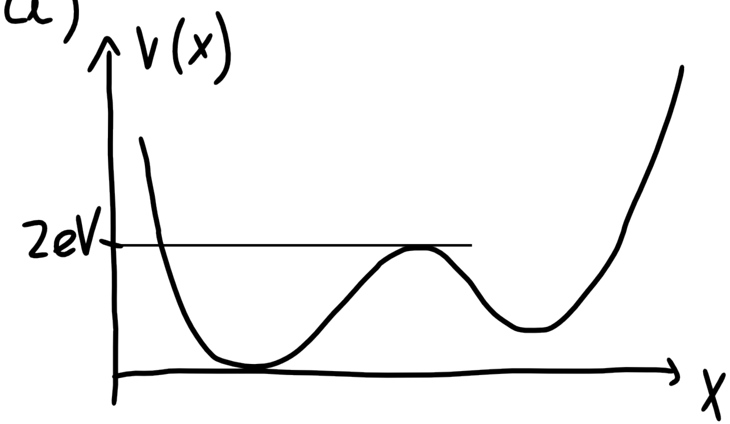
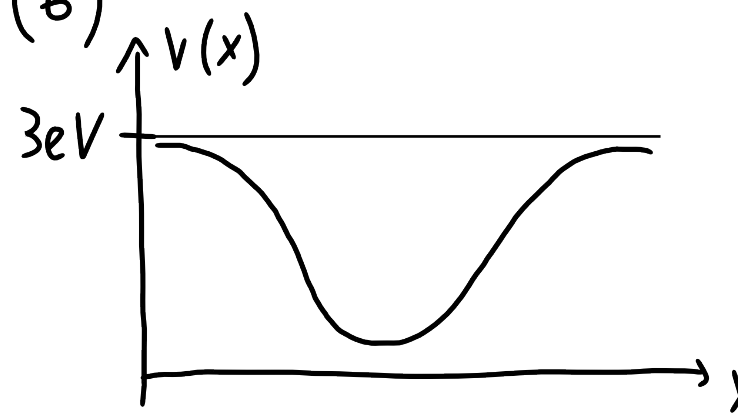
$\mathrm{Re}(e^{itE/h}) = \cos(Et/h)$ $\mathrm{Im}(e^{itE/h}) = \sin(Et/h)$
they oscillate 90 out of phase

A particle with total energy 3eV is in a bound state in which of of the potentials below?

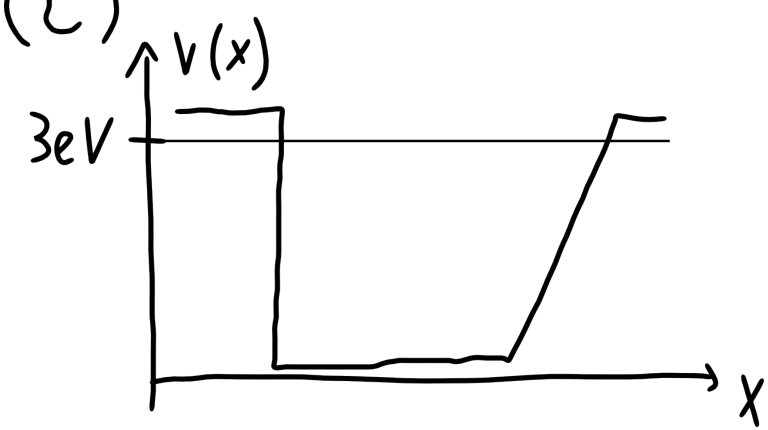
(a)



(b)



(c)



D) a and c

E) a, b and c

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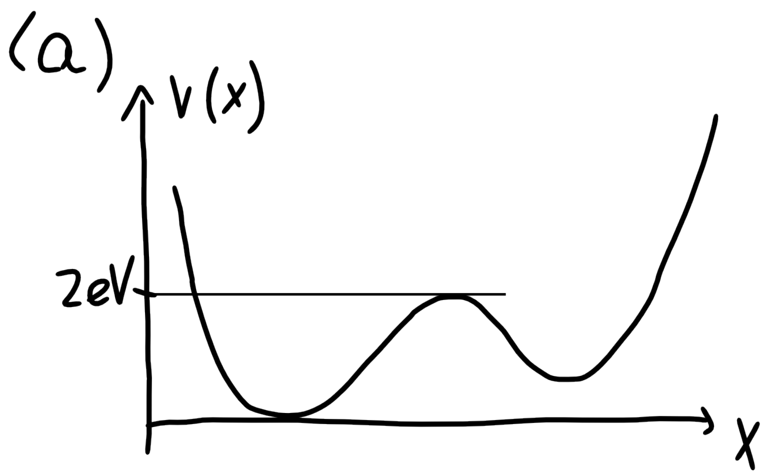

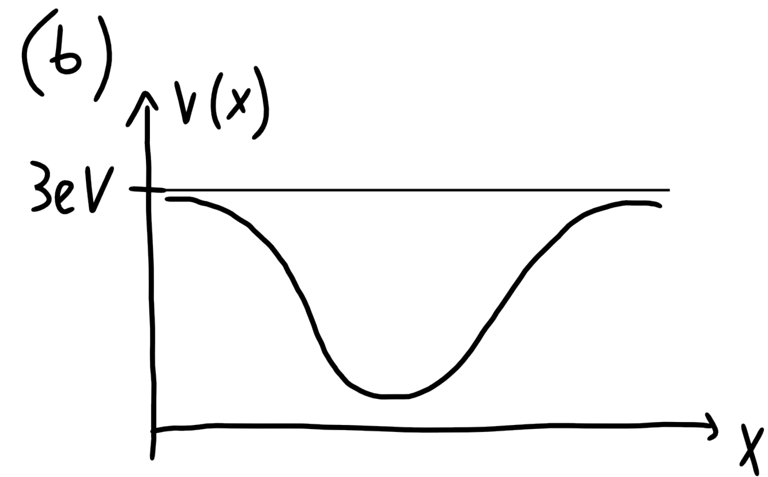

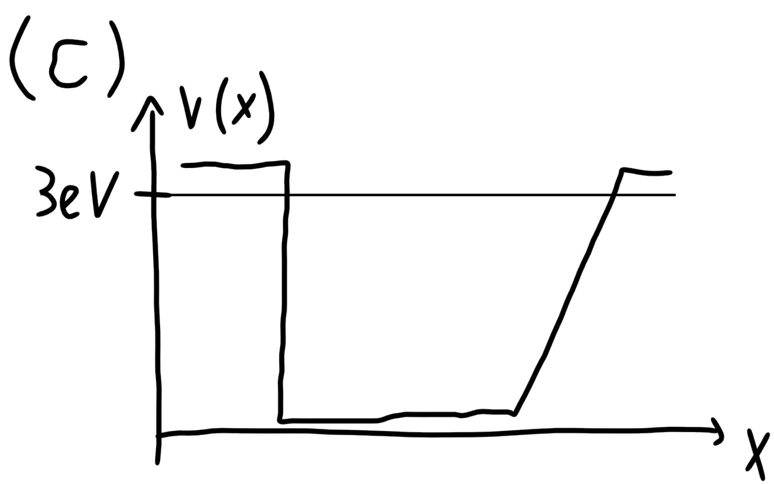

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E) a, b and c

The particle's energy must be less than the potential at inifinity.

Which of the equations below is the time-independent SE for the electron in the Hydrogen atom?

A) $-\frac{\hbar^2}{2m}\left(\partial_x^2 \psi_E + \partial_y^2 \psi_E + \partial_z^2 \psi_E\right) = E\psi_E$

B) $-\frac{\hbar^2}{2m}\left(\partial_x^2 \psi_E + \partial_y^2 \psi_E + \partial_z^2 \psi_E\right) = -i\hbar\partial_t \psi_E$

C) $-\frac{\hbar^2}{2m}\left(\partial_x^2 + \partial_y^2 + \partial_z^2\right)\psi_E + \frac{1}{4\pi\epsilon_0}\frac{e^2}{|\vec{r}|}\psi_E = E\psi_E$

D) $-\frac{\hbar^2}{2m}\left(\partial_x^2 + \partial_y^2 + \partial_z^2\right)\psi_E - \frac{1}{4\pi\epsilon_0}\frac{e^2}{|\vec{r}|}\psi_E = E\psi_E$

E) $-\frac{\hbar^2}{2m}\left(\partial_x^2 + \partial_y^2 + \partial_z^2\right)\psi_E + \frac{1}{4\pi\epsilon_0}\frac{e^2}{|\vec{r}|}\psi_E = -i\hbar\partial_t \psi_E$

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