

Question 1

The time-independent Schrödinger equation inside a finite well becomes:

$$\frac{d^2\psi}{dx^2} = -k^2\psi.$$

where $k = \sqrt{2mE/\hbar^2}$. Consider the following as possible solutions:

$$\psi_1(x) = A \sin(kx)$$

$$\psi_2(x) = A \cos(kx)$$

$$\psi_3(x) = Ae^{kx}$$

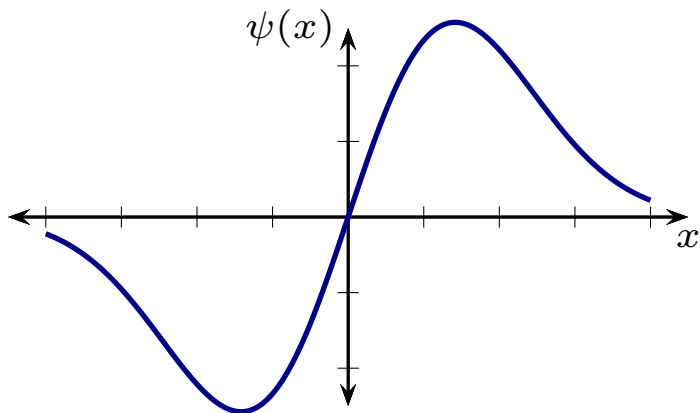
$$\psi_3(x) = Ae^{-kx}.$$

Which of these are possible solutions?

1. All of them.
2. Only 1.
3. Only 2.
4. Only 1 and 2.
5. Only 3 and 4.

Question 2

A possible antisymmetric energy eigenstate for the harmonic oscillator is as illustrated.



Which of the following is true?

1. $\langle x \rangle = 0$
2. $\langle x \rangle > 0$
3. $\langle x \rangle < 0$