Question 1

A particle in an infinite well can have energies

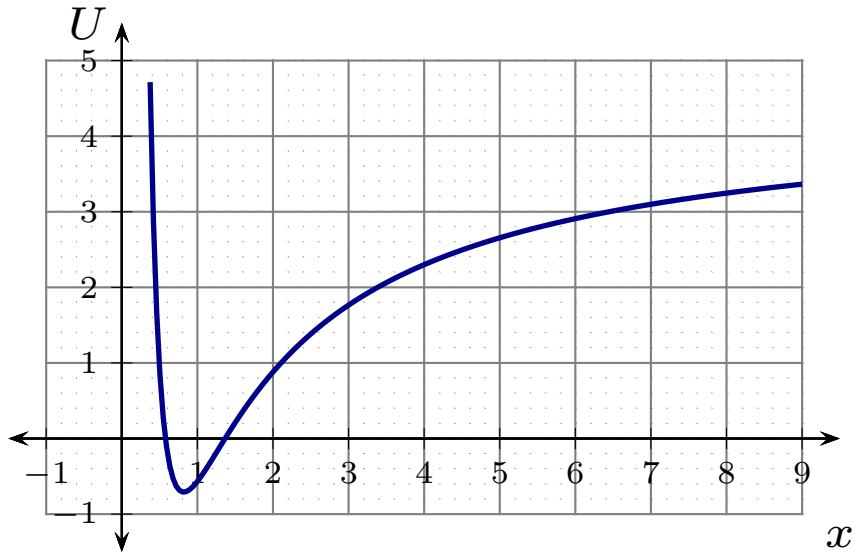
$$E_n = n^2 \frac{\hbar^2 \pi^2}{2mL^2}.$$

Of the following, which transition results in emission of light with the largest wavelength?

1. Jump from $2 \rightarrow 1$
2. Jump from $3 \rightarrow 1$
3. Jump from $3 \rightarrow 2$
4. Jump from $4 \rightarrow 1$
5. Jump from $4 \rightarrow 2$

Question 2

The potential energy for a particle is as illustrated. The horizontal axis indicates position in meters and the vertical axis energy in Joules.

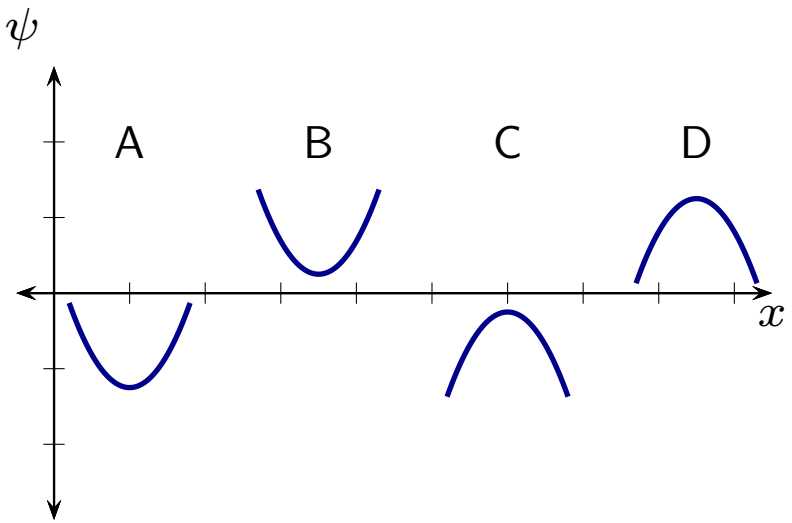


Suppose that the total energy of the particle is 2 J. What are the possible locations of the particle?

1. Approx. $0\,\text{m} \leqslant x \leqslant \infty$
2. Approx. $0\,\text{m} \leqslant x \leqslant 0.5\,\text{m}$
3. Approx. $0.5\,\text{m} \leqslant x \leqslant \infty$
4. Approx. $0.5\,\text{m} \leqslant x \leqslant 3.5\,\text{m}$
5. Approx. $3.5\,\text{m} \leqslant x \leqslant \infty$

Question 3

A particle is restricted to a region in which $E > U$. Segments of wavefunctions are illustrated.



Which of these are possible?

1. All are possible.
2. Only A and B.
3. Only C and D.
4. Only A and D.
5. Only B and C.