Question 1

A particle is restricted to the region:

$$0 \leqslant x \leqslant L$$

$$0 \leqslant y \leqslant L$$

$$0 \leqslant z \leqslant L$$

Suppose that the wavefunction for the particle in this region is

$$\Psi(x, y, z, t) = Ae^{i(k_x x + k_y y + k_z z - \omega t)}$$

where k_x, k_y, k_z are constants.

Which of the following is true?

1. $A = 1$

2. $A = L$

3. $A = L^3$

4. $A = \dfrac{1}{L}$

5. $A = \dfrac{1}{L^3}$

Question 2

Consider a free particle in three dimensions. Two candidates for solutions to the TISE are:

$$\psi_1(x, y, z) = Ae^{i2x} + Ae^{iy}$$

$$\psi_2(x, y, z) = Ae^{i2x}e^{iy}.$$

Which of the the following is true?

1. Both are solutions regardless of energy.

2. Both are solutions only for some energies.

3. Neither are solutions.

4. Only ψ_1 is a solution.

5. Only ψ_2 is a solution.