1. Consider the Gaussian distribution

$$\rho(x) = A e^{-\lambda(x-a)^2}$$

where A, a, λ are constants. Determine A.

Hint :- Normalize the wavefunction.

2. A particle is represented by the wavefunction

$$\psi = A e^{i\omega t} e^{-x^2/2a^2}$$

where A, ω, a are real constants. Determine A.

3. Normalize the wavefunction $\psi = A e^{i(\omega t - kx)}$ where A, K, ω are real positive constants.

4. i) An electron of energy 200 eV is passed through a circular hole of radius 10^{-4} cm. What is the uncertainty introduced in the angle of emergence?

ii) What would be the corresponding uncertainty for a 0·1 g lead ball thrown with a velocity 10^3 cm/sec through a hole 1 cm in radius?