A. Born rule for momentum probabilities

A spin lees particle moves in one dimension and, at some instant, is described by the wave function $\psi(x) = \langle x|\psi \rangle$. At that instant the momentum of the particle is measured. What are the possible outcomes of this measurement and with which probabilities (probability densities, to be more precise)?

B. Born rule until we learned it

Solve Griffiths 4.49

C. Center-of-mass coordinate, reduced mass and all that

Solve Griffiths 5.1.