3. A non-relativistic free particle of mass m moving in one dimension has wavefunction

$$\psi(x,t) = A\exp\left(\frac{\mathrm{i}}{\hbar}\left(px - E(p)t\right)\right) + A\,R\exp\left(-\frac{\mathrm{i}}{\hbar}\left(px + E(p)t\right)\right),$$

where A and R are constants. Find $E(p)$. At time $t = 0$ the momentum of the particle is measured. What are the possible outcomes and their respective probabilities?