

What is $|\Psi(x, t)|^2$? Compare with the stationary Gaussian case and argue that the center of the Gaussian is now moving with “velocity” $v_0 = \frac{\hbar k_0}{m}$. What is happening to the height and the width of the Gaussian as t increases?

(c) What are $\langle \hat{x} \rangle$ and $\langle \hat{p} \rangle$ at arbitrary time? For $\langle \hat{x} \rangle$ useful to shift integration variable from x to $y = x - v_0 t$. For $\langle \hat{p} \rangle$ use a handy relation between $\langle \hat{p} \rangle$ and $\langle \hat{x} \rangle$ that we’ve encountered in the past. Is $\langle \hat{p} \rangle$ what you expect it to be? Does it depend on t ?