Solution to the Reflective Homework

1) I disagree. Only when acting on the state of the system $\Psi(x,t)$ will $i\hbar\frac{\partial}{\partial t}$ give the same thing as what $\hat{H}$ acting on $\Psi(x,t)$ gives. But $i\hbar\frac{\partial}{\partial t}$ will not give the same thing acting on any function of x and t as $\hat{H}$ acting on that function will give.

2) I disagree. The Hamiltonian $\hat{H}$ acting on $\psi_1(x)$ gives $E_1\psi_1(x)$ and $\hat{H}$ acting on $\psi_2(x)$ gives $E_2\psi_2(x)$. But $\hat{H}$ acting on a linear superposition of $\psi_1(x)$ and $\psi_2(x)$, e.g., $\psi_1(x)+\psi_2(x)$, gives $E_1\psi_1(x)+E_2\psi_2(x)$ which is not the same as a constant times $\psi_1(x)+\psi_2(x)$ so it does not satisfy $\hat{H}\psi(x)=E\psi(x)$.

3) In the position-momentum uncertainty pronciple, the inequality becomes an equality for Gaussian wave functions.

4) No, measurement of an observable on the system will collapse the wave function into an eigenstate of the operator corresponding to the observable measured (in this case position eigenstate if we measure position). If we make repeated measurement of position on this system, we are not going to obtain the probability density for position measurement in the state before the measurement since the wave function has changed after the first position measurement.