PHY 341 HW Ch.2b

Do problems 2.8, plus the following:

q2-5 Regarding a well-behaved but otherwise arbitrary wave function $\Psi(x,t)$, (a) Is it always normalizable? Write it down. (b) Now ask ChatGPT the same question, critique and compare its answer with yours.

q2-6
(a) If you had not done Problem 2.8 in the book yet, do it now.
(b) Find and copy a solution from any potential source of cheating, e.g., solutions on the web, cheqq, chatGPT, etc. Reflect on and critique the solution or the process.
As unusual as it seems, I ask you to do this exercise because, even though cheating in the internet age is easy, it is important to know that: (i) To know the stuff, you have to do it yourself, make mistakes, and learn from them; and yes, making mistakes is part of the learning process; (ii) The solutions floating out there are highly questionable and we need to be critical evaluators of information and sources; and (iii) we place high confidence in you – physics and science majors – not to hurt your long-term prospect with short-term "gain".

q2-7
The wave function at $t = 0$ is $\Psi(x,0) = \sum_{n=0}^{n=10} c_n \psi_n(x)$, where c_n are nonzero constants and ψ_n the stationary states of the infinite potential well. At later times t, which of the following is *independent* of time? Answer each as true or false, and briefly state reason.
(a) position, $\langle x \rangle$

(b) momentum, $\langle p \rangle$

(c) momentum squared, $\langle p^2 \rangle$

(d) energy, $\langle E \rangle$

(e) potential energy, $\langle V \rangle$

(f) kinetic energy, $\langle T \rangle$