

B1) A particle of mass m moves in one dimension and has a constant force F acting on it.

a) (2 points) Will the spectrum of eigenvalues of the Hamiltonian be discrete, continuous, or partially discrete and partially continuous? Give an explanation of the reasoning you use in reaching your answer. Your explanation need not be long, but it must show that you understand what factors determine whether the spectrum is discrete or continuous.

b) (2 points) In what range do you expect the eigenvalues to lie? [For example, you might specify 0 to ∞ .] Again, give your reasoning.

c) (2 points) Are the eigenfunctions degenerate, and if they are, how many eigenfunctions have eigenvalue E ? Give your reasoning.

d) (2 points) Find an equation for $d(\langle p \rangle_t)/dt$ and solve it. Compare the time dependence of this expectation value to what is found for $p(t)$ in classical mechanics.

e) (2 points) Find an equation for $d(\langle x \rangle_t)/dt$ and solve it. Compare the solution to that found in classical mechanics.