5. (continued)

(f) If a measurement of the energy were made just after the measurement of part (e), what are the possible results of the measurement and what are the probabilities for each result?

$|v_1\rangle = \frac{1}{\sqrt{2}}[|u_1\rangle + |u_2\rangle]$

$P_1 = \left|\frac{1}{\sqrt{2}}\right|^2 = \frac{1}{2}$; $E_1 = E_0 + \epsilon$

$P_2 = \left|\frac{1}{\sqrt{2}}\right|^2 = \frac{1}{2}$, $E_2 = E_0 - \epsilon$

(g) Given that the system is in an eigenstate of $Q$ at $t = 0$, is $\langle E \rangle$ a constant in time?

Yes, since $[H, H] = 0$