Consider a quantum particle on a ring. At $t = 0$, the particle is in state:

$$|\Phi(t=0)\rangle = \frac{7i}{10}|-2\rangle - \frac{1}{2}|-1\rangle + \frac{1}{2}|0\rangle - \frac{1}{10}|2\rangle$$

1. Find $|\Phi(t)\rangle$
2. Calculate the probability that you measure the z-component of the angular momentum to be $-2\hbar$ at time t. Is it time dependent?
3. Calculate the probability that you measure the energy to be $\frac{2\hbar^2}{I}$ at time t. Is it time dependent?