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. Go to the Ring States GeoGebra applet on the course schedule. Explore changing values of initial coefficents in the applet and see how $Re(\psi)$, $Im(\psi)$, and $|\psi|^2$ change with time.
   Then, create the state given above. How do both pieces of the wavefunction and the probability density change with time?

3. Calculate the probability that you measure the z-component of the angular momentum to be $-2\hbar$ at time t. Is it time dependent?

4. Calculate the probability that you measure the energy to be $\frac{2\hbar^2}{I}$ at time t. Is it time dependent?