None

## Student handout

### Spin-1 Time Evolution

1. Use a completeness relation to rewrite each of the states below in the $z$-direction.

   - $|\psi_A\rangle = |-1\rangle_x$
   - $|\psi_B\rangle = \frac{1}{\sqrt{2}}|+1\rangle_z - \frac{1}{\sqrt{2}}|-1\rangle_z$
   - $|\psi_C\rangle = |-1\rangle_z$

2. Suppose the Hamiltonian is given by $\hat{H} = \omega_o \hat{S}_x$.

   a) Identify the energy eigenstates and their corresponding energy eigenvalues.
   b) Use them to write each state at a later instant in time.
   c) Represent each state using Arms as complex numbers.

3. For $|\psi_C\rangle$:

   a) List the possible values of a measurement of $S_z$ and calculate the corresponding probabilities.
   b) List the possible values of a measurement of $S_x$ and calculate the corresponding probabilities.
   c) Graph any probabilities that depend on time.