

1 Phase 2

Consider the three quantum states:

$$|\psi_1\rangle = \frac{4}{5}|+\rangle + i\frac{3}{5}|-\rangle$$

$$|\psi_2\rangle = \frac{4}{5}|+\rangle - i\frac{3}{5}|-\rangle$$

$$|\psi_3\rangle = -\frac{4}{5}|+\rangle + i\frac{3}{5}|-\rangle$$

- (a) For each quantum state $|\psi_i\rangle$ given above, calculate the probabilities of obtaining $+\frac{\hbar}{2}$ and $-\frac{\hbar}{2}$ when measuring the spin component along the x -, y -, and z -axes (i.e., S_x , S_x , and S_z).
- (b) *Look For a Pattern (and Generalize)*: Use your results from (a) to comment on the importance of the overall phase and of the relative phases of the quantum state vector.