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.