1 Measurement Probabilities

A beam of spin-$\frac{1}{2}$ particles is prepared in the initial state

$$|\psi\rangle = \sqrt{\frac{2}{5}}\,|+\rangle_x - \sqrt{\frac{3}{5}}\,|-\rangle_x$$

(Note: this state is written in the S_x basis!)

(a) What are the possible results of a measurement of S_x, with what probabilities?

(b) Repeat part a for measurements of S_z.

(c) Suppose you start with a particle in the state given above, measure S_x, and happen to get $+\hbar/2$. You then take that same particle and measure S_z. What are the possible results and with what probability would you measure each possible result?