Introduction to Quantum Mechanics 1
Quiz 2

Name:

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Using the properties of the σ symbols, compute

$$\frac{1+\sigma_z}{2}\frac{1+\sigma_x}{2}\frac{1+\sigma_z}{2}$$

and thereby determine $p(+x,+z)$, the probability of finding $\sigma_x = +1$ given that the system was previously placed in the state $\sigma_z = +1$.

Solution:

$$\frac{1+\sigma_z}{2}\frac{1+\sigma_x}{2}\frac{1+\sigma_z}{2} = \frac{1}{2}\frac{1+\sigma_z}{2} + \frac{\sigma_x}{2}\frac{(1-\sigma_z)(1+\sigma_z)}{4} = \frac{1}{2}\frac{1+\sigma_z}{2},$$

so

$$p(+x,+z) = \frac{1}{2}.$$