PHYS3701   Introduction to Quantum Mechanics I   Spring 2021

Homework Assignment #2

Due at 5pm to the **Grader** on Thursday 28 Jan 2021

(1) Consider a quantum state $|\psi(t)\rangle$ which changes with time t as

$$|\psi(t)\rangle = \frac{1}{\sqrt{2}}|+\mathbf{z}\rangle + \frac{e^{i\omega t}}{\sqrt{2}}|-\mathbf{z}\rangle$$

where ω is a real number. Interpreting the expectation value as the average of a large number of measurements, calculate $\langle S_z\rangle$ and $\langle S_y\rangle$ as a function of time. What is happening, physically? Can you guess what $\langle S_x\rangle$ turns out to be without actually calculating it?

(2) Using the $|+\mathbf{y}\rangle$ and $|-\mathbf{y}\rangle$ states as a basis, find the representation (as column vectors) for the states $|+\mathbf{x}\rangle$ and $|-\mathbf{x}\rangle$.