

Physics 491: Recitation #12  
December 2, 2016

1. Calculate the eigenvalue of the total spin-squared operator  $\hat{S}^2 = \left| \hat{S}^a + \hat{S}^b \right|^2$  acting on the product state

$$\frac{1}{\sqrt{2}} (|1/2, +1/2\rangle_a |1/2, -1/2\rangle_b - |1/2, -1/2\rangle_a |1/2, +1/2\rangle_b)$$

2. Consider the harmonic oscillator state at  $t = 0$

$$|\psi(0)\rangle = \frac{1}{\sqrt{2}} (|n\rangle + |n+1\rangle)$$

Find the expectation value of  $\hat{y}$  as a function of time.