Additional Homework
(Due December 1, 2010 with last Homework Set)

Extra Problem 1

A large number of electron-positron pairs in the singlet state $|\chi_S>$ is sent (one at a time) through two separate Stern-Gerlach machines. The spin of the electron in each pair is measured by machine **A** oriented along arbitrary direction $\hat{\mathbf{a}}$ and the spin of the positron in each pair is measured by machine **B** oriented along arbitrary direction $\hat{\mathbf{b}}$. The results from all the measurements are correlated and compared. Find the probability of obtaining (i) both spins "up" or both spins "down", i.e. in the same orientation and (ii) one of the spins "up" and one of the spins "down", i.e. in opposing orientations.

Hint: Study the results from problems 4.30 and 4.50, then consider what you get when you operate on the singlet state with $S_a S_b$.