1) Consider a multielectron wavefunction with three electrons in the following orbitals:

\[
\chi_1 = \psi_1 \alpha \\
\chi_2 = \psi_1 \beta \\
\chi_3 = \psi_2 \alpha
\]

Construct a properly antisymmetrized wavefunction for this system.

2) In class, I showed the examples of wavefunctions whose electrons had parallel or antiparallel spins, but skipped over a couple of steps. Write out the antisymmetrized wavefunctions for the two-electron systems \( \{ \chi_1 = \psi_1 \alpha, \chi_2 = \psi_2 \beta \} \) and \( \{ \chi_1 = \psi_2 \alpha, \chi_2 = \psi_2 \alpha \} \) and derive the probability of finding both electrons in the same location for each case (i.e. exactly what I did in class but showing all of the steps).