Worked problems to prepare: Blundell 3.3, 3.6, 4.1

To turn in:

1. Blundell 2.5

2. Most theoretical models of magnetism reduce complicated exchange-type integrals over continuous spatial variables by discrete models whose near-neighbor interactions are of the Heisenberg type, $S_i \cdot S_j$ (Blundell §4.2). This could be seen as a kind of Taylor expansion, in which the Hamiltonian would look like

$$\alpha_0 + \alpha_1 S_i \cdot S_j + \alpha_2 (S_i \cdot S_j)^2 + \alpha_3 (S_i \cdot S_j)^3 \ldots$$

Show that for spin-1/2 particles, the series may be truncated exactly at the Heisenberg term without any loss of generality.