Assignment P2-1

1. In the molecular surface reaction of N_2 interaction with iron (Fe) solid surface, the elemental iron is *bcc* in its ground state, which is metallic only due to 2 of its valence electrons. Within the free electron theory, calculate the Fermi energy (E_F in the units of eV) of elemental iron (Fe at T= 0 K). Consider the atomic radius of Fe is 1.86 Å.

Plank constant (ħ ; read it as h-bar)= 1.05×10^{-34} J.s
Mass of electron (m) = 9.1×10^{-31} kg
1 eV = 1.6×10^{-19} J

2. Write the Hamiltonian that one would need to calculate the electronic wavefunction for a system of interacting particles. The system consisting of two atoms labeled as A and B each with an electron is pictorially depicted below.