Phys 430 - 3^{rd} HOMEWORK

1. Find the Fermi temperature for at least 4 metals of your choice. You can either use the formula that we have derived in the class expressing the Fermi energy in terms of the density of electrons or find it a directly. You will not get any points if you do not cite your source.

2. Show that for a one dimensional boson gas, the Bose Einstein condensation (BEC) temperature is $0K$, i.e., BEC does not exist in a one dimensional non interacting free boson gas.

3. Calculate the pressure and the energy of a 3D non-interacting boson gas below its BEC critical temperature.

4. We have calculated the correction to the equation of state of a gas when the relative separation between the particles approaches the thermal de Broglie wavelength. Now, calculate the correction to the energy.

5. In an electron gas at low temperatures, calculate the leading temperature dependence of the relative fluctuation of energy.