HW 3_1

1. Below **T = 24.5 K**, **Ne** is a crystal with an FCC structure. As discussed in class & in **Ch. 3** of Kittel's book, interatomic bonding in the Noble Gas solids is caused by the Van der Waals force. Assume that the interaction energy associated with this force is given by the Lennard-Jones potential (**Eq. (10)**) for each pair of nearest neighbors. Note that the values of the Lennard-Jones parameters σ & ε are tabulated for all Noble Gas solids in **Table 4**, page 53. (**Note!** The energies ε in that table are given in old fashioned ergs units!!). Also, the cohesive energy of a Nobel Gas solid, obtained from the Lennard-Jones potential, is given by **Eq. (15)**.
   a. In **Ch. 3**, it is stated that the equilibrium nearest-neighbor distance $\mathbf{R_0}$ obtained from **Eq. (15)** is given by $\mathbf{R_0 = 1.09\sigma}$. ***Prove*** that this result is correct. Numerically ***calculate*** $\mathbf{R_0}$ for solid **Ne**.
   b. **Calculate** the bonding energy ***per atom*** in solid **Ne**.
   c. **Calculate** the density of solid **Ne**.

2. Work problem 1 at the end of chapter 3 in Kittel.

3. Work problem 2 at the end of chapter 3 in Kittel.

4. Work problem 3 at the end of chapter 3 in Kittel.