ECE 542
Homework #1

Due: Jan. 15, 2020

1. A semiconductor has a bandgap of 0.5 eV. What is the bandgap in Joules?

2. A semiconductor has a bandgap of 2×10^{-19}J. What is the bandgap in eV?

3. Find the cost per transistor for:

    a. A single transistor
    b. An representative IC

    For both cases, specify the source (e.g. Digikey) and the part number.

    You should notice that the cost per transistor of an IC is orders of lower than the cost of a single transistor. Also, notice that this cost per transistor does not include the printed circuit board space required, or assembly cost.

4. Using a computer and your favorite math program, plot the Fermi-Dirac distribution function as a function of energy. On the same plot, show the Maxwell-Boltzmann distribution function. The y-axis should range from 0 to 2. The x-axis should range from $E_F - 1$ eV to $E_F + 1$ eV. Do this at a temperature of 300 K. Over what range does the Maxwell-Boltzmann distribution function approximate the Fermi-Dirac distribution function?