Midterm Exam #1

1) There is an intrinsic block of silicon as shown below 6 mm wide by 1mm thick by 10mm long. Half of the block is heated to T=700K and the other half is heated to T=550K. (Ignore any temperature gradients and just assume uniform temperature within each half.)

  a) What is the resistance of the sample? (You may assume that the mobility has a temperature dependence of $T^{-3/2}$.)

  b) Now consider the sample to be doped to $N_d = 10^{14} cm^{-3}$. What is the resistance?
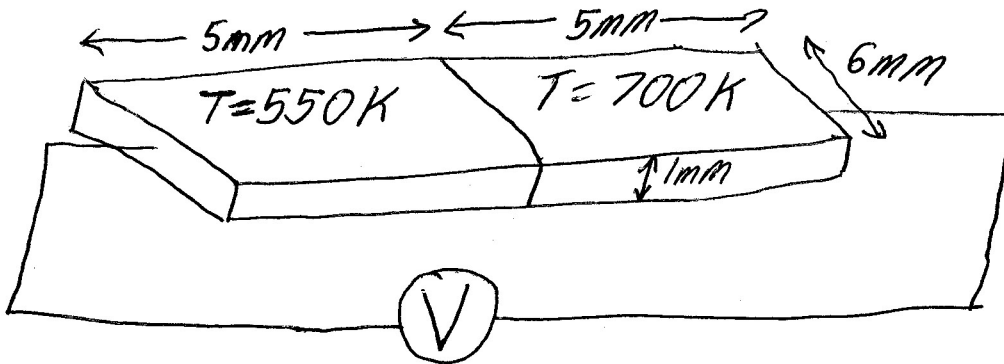
2) A semiconductor system has the electric field vs. x diagram given below:

  a) Sketch the band diagram for the system. What is the system?

  b) Sketch the potential vs. x

  c) Sketch the charge vs. x