Physics 8510

Problem Set 2

1) A sample of Ge has both electrons and holes carrying the current. When a hall measurement is done, there is no Hall effect. If the mobility of electrons in Germanium is 3500 cm ^{2} /V s and that of holes is 1500 cm ^{2} /V s, show that 30 % of the current is carried by the electrons. (Hint: Genaralize the equation of motion for the rate of change of the y momentum of the electrons and holes.)

2) A well lagged wire (no heat enters or leaves except at the ends) length L and cross sectional area A has its ends maintained at T_1 and T_2 .The thermal conductivity of the wire K = B +CT where B and C are constants. Show that the rate of flow of heat along the wire is given by dQ/dt = A/L $(T_1 - T_2)\{B + C/2\ (T_1 + T_2)\}$.