ECE 656: Fall 2009
Lecture 7 Homework

1) Work out the following sum for a ballistic, 1D resistor at $T = 0K$:

$$I^+ = \frac{1}{L}\sum_{k>0} q\upsilon_x f_0(E_{F1})$$

2) Use the result from the corresponding sum over negative k-states,

$$I^- = \frac{1}{L}\sum_{k<0} q\upsilon_x f_0(E_{F2})$$

to show that for small bias, $qV = E_{F1} - E_{F2}$, the resulting current is

$$I - I^+ - I^- = \frac{2q^2}{h}V$$