HW#2
Due 1/30/00

1. Show the general steady state solution of the one dimensional Boltzmann equation is of the form: $f(\frac{1}{2}mv^2 + q\Phi(x)) = f(E)$. Where Φ is the potential function.

2. Consider the bi-Maxwellian distribution with temperatures ($T_\perp$, $T_\parallel$)

$$f(v) = n_0 C_\perp C_\parallel \exp[\frac{m}{2k_B}(\frac{v_x^2 + v_y^2}{T_\perp} + \frac{v_z^2}{T_\parallel})]$$

a) find the normalization factors, $C_\perp$s so the $\int f(v)\, d^3v = n_0$

b) Find the averaged kinetic energy in the two directions (perpendicular and parallel)

3, A cylindrical plasma fluid immersed in an uniform magnetic field in z direction. If there is a radial pressure gradient, find the drift motion of the plasma. Will there be a net current?

4. a) Find the one dimensional averaged velocity , v_X of a isotropic 3-D Maxwellian distribution.

b) Find the flux in the x direction.