

**Home set #4**  
**Due 2/15/00**

1. Find the off diagonal elements of the anisotropic magnetized plasma pressure tensor in the laboratory frame using the unitary rotation tensor.
2. Show the second adiabatic condition from the invariance of the phase space volume  $(r,v)$ .

$$\frac{d}{dt} \left( \frac{P^2 P_{\parallel}}{5 m} \right) = 0$$

3. For the 1-D diffusion equation, use the method of separation of variable to find  $n(x,t) = X(x)T(t)$ , for the initial condition

$$\frac{n(x,t)}{t} = D \frac{\partial^2 n(x,t)}{\partial x^2} \quad n(x,t=0) = \exp\left[-\frac{x^2}{x_0^2}\right]$$

4. For the electron heat flux vector  $\vec{q}$  in a magnetic field in z direction

$$\vec{q}_e + -ce (\vec{q}_e \times \hat{e}_z) = -K_o T_e$$

find the elements of the heat conduction tensor in the form:

$$\vec{q}_e = \vec{K} \vec{T}_e$$

The conduction tensor has the form:

$$\begin{bmatrix} k & -k_H & 0 \\ k_H & k & 0 \\ 0 & 0 & k_o \end{bmatrix}$$