HW #7

Due 4/6/00

1. For a perfect conducting plasma fluid (ideal MHD), find the first order magnetic field , B_1, associated with a pure Alfven wave which propagates parallel to the static magnetic field, B_o.

2. Find the first order B_1 for the perpendicularly propagating magnetosonic wave.

3. In an anisotropic perfectly conducting plasma fluid with a static field $\vec{B_0} = B_0\hat{e}_z$, If a first order plane wave perturbation perpendicular to the magnetic field is imposed on the plasma , $\vec{\Delta} = \Delta\ \hat{e}_x \exp[i(k\ x + k_{||}z - \omega t)]$. Find the first order anisotropic pressure tensor in the laboratory frame for the double adiabatic theory.

$p = p^{(o)} + p^{(1)}$

$p_{||} = p_{||}^{(o)} + p_{||}^{(1)}$

$\vec{\vec{P}} = p^{(1)}\vec{\vec{I}} + (p_{||}^{(1)} - p^{(1)})\hat{b}_o\hat{b}_o + (p_{||}^{(o)} - p^{(o)})(\hat{b}_1\hat{b}_o + \hat{b}_o\hat{b}_1)$

(Make the approximation that $|B_1| << |B_o|$ in the sam direction).

4. Find the force density due to the first order pressure perturbation found in problem 3.