Problem Set 4 – part 2

5. Consider the existence of general competitive equilibrium in a pure exchange economy subject to excise tax on net purchases. All taxes are rebated as lump sums equally to all households. This is the model of Starr's *General Equilibrium Theory,* problem 12.2 (similar in two editions).
We use the following notation:

p is the N-dimensional nonnegative price vector,

x^i is the N-dimensional nonnegative vector of household i's consumption, x^i is a decision variable for i

r^i is the N-dimensional nonnegative vector of i's endowment

$D^i(p)$ ($= x^i$) is the N-dimensional vector of i's consumption as a function of p, based on i's budget which is denoted $M^i(p)$

#H is the finite integer number of households in the economy consisting of the set H

τ is the N-dimensional nonnegative vector of excise tax rates (on net purchases) in the economy

T is the transfer of tax revenue to the typical household.

The budget constraint is $p \cdot x^i + \tau \cdot (x^i - r^i)_+ = M^i(p)$ where

$M^i(p) = p \cdot r^i + T$ where $T = (1/\#H)\Sigma_{h \in H}\, \tau \cdot (x^h - r^h)_+$

where the notation $(\cdot)_+$ indicates the vector consisting of the nonnegative co-ordinates of $(\cdot)$ with zeroes replacing the negative co-ordinates of $(\cdot)$. The household is assumed to treat T parametrically --- as independent of his own expenditure decisions.
Please make the usual assumptions about continuity, convexity, monotonicity of preference, and adequacy of income.

Will a Walrasian competitive equilibrium exist generally in the economy with excise taxation? Explain why or why not. State any additional assumptions you need. Feel free to cite well-known results.

6. Consider a Walrasian competitive general equilibrium in the model of problem 5 above. Will the allocation be Pareto efficient?