

due : Wednesday October 10 2001 before class

Answer all 5 questions. All count equally.

1. Is the equilibrium allocation for the following economy efficient? Explain briefly.

Everyone in the economy has the same demand functions, namely

$$x_i = \frac{M^i}{2P_x} \quad ; \quad y_i = \frac{M^i}{2P_y}$$

where  $x_i$  and  $y_i$  are person  $i$ 's demand for food and clothing,  $M^i$  is the person's income, and  $P_x$  and  $P_y$  are the prices the people face for food and or clothing.

[ These demand functions are those which arise if every person had *Cobb–Douglas* preferences, represented by a utility function  $U(x, y) = xy$ . ]

There are 2 million people ; 1 million each have an endowment  $(\bar{x}_1, \bar{y}_1) = (1, 0)$  ( that is an endowment of 1 unit of food, and no clothing ), while the other 1 million have an endowment of  $(\bar{x}_2, \bar{y}_2) = (0, 1)$ .

The economy is perfectly competitive, except that the government levies a 25 percent income tax on the value of each person's endowment, and pays out the revenue collected from this tax equally to all people.

2. Suppose, in an economy with production, that each person worked a fixed number of hours per week — 40 hours — each week of her working life. Her income, when working, then equals  $40w$  where  $w$  is her hourly wage. This wage is an increasing function of how many years of higher education that the person has had.

People can choose how much education to acquire. Assume ( unrealistically ) that people can borrow when young against future labour earnings. Assume ( also unrealistically ) that people do not do any paid work while they are acquiring education.

Would the allocation in this economy be efficient if the government levied a proportional income tax, paying out the revenue from this tax equally to all people?

3. Calculate the cost of a tax of \$5 per cup of coffee to the following person.

The person's income is \$100 ( per day ). Her preferences can be represented by a utility function

$$U(y, x) = y + 2x - \frac{1}{2}x^2$$

where  $x$  is the number of cups of coffee she consumes, and  $y$  is the amount she spends on goods and services other than coffee.

The net-of-tax price of coffee is \$1 per cup ( and is unaffected by the tax ).

4. What would the incidence be of a \$1 unit tax on video rentals, if the market for video rentals were perfectly competitive, if the demand curve for video rentals had the equation

$$Q^D = 55 - 5P^D$$

where  $Q^D$  is the quantity demanded by demanders and  $P^D$  the price paid by demanders, and if the quantity supplied of video rentals were

$$Q^S = 15p_s - 5$$

where  $Q^S$  is the quantity supplied by suppliers and  $p_s$  is the price received by suppliers?

5. Municipalities often levy special fees on new houses, in an attempt to make builders of new houses pay for the costs of public services which the municipality must supply to residents of the houses.

Discuss briefly the incidence of the following development levies :

*a* A levy of \$5000 on every new house built in King Township ( a relatively small township located northwest of Toronto )

*b* A levy of \$5000 on every new house built in the 905 area code ( an area of perhaps 1000 square miles, completely surrounding the city of Toronto )