

Do **all 5** questions. All count equally

1. Suppose that the compensated demands for food and clothing were

$$Q_F = 18 - 2P_F - P_C$$

$$Q_C = 12 - P_F - 2P_C$$

( where  $Q_C$  and  $Q_F$  are the quantities demanded of food and clothing, and  $P_F$  and  $P_C$  are the prices buyers pay for food and clothing ).

If the net-of-tax prices of food and clothing were fixed at  $p_F = p_C = 1$ , would it be optimal to levy a 50% tax on food, and a 50% tax on clothing? Explain briefly.

2. If the compensated demands were as in question #1 above, would it ever be optimal to levy a tax of 0.70 on food, and 0.10 on clothing ( with the net-of-tax prices of food and clothing still  $p_F = p_c = 1$  )?

3. Suppose that a person's taxable income decreased with the income tax rate she faced, due to her reduction in labour supply. In particular, suppose that each person's taxable income, if the marginal income tax rate were  $t$ , could be written

$$z[1 - 3t^2] \tag{*}$$

where  $z$  is the person's taxable income if there were no taxes. ( That is, an income tax at the rate  $t$  reduces each person's taxable income to a fraction  $(1 - 3t^2)$  of what it would be if there were no tax. ) People differ in their level of  $z$ , but each person's response to taxation obeys equation (\*).

If the government were to introduce a proportional income tax at the rate  $t$ , which tax rate would maximize the total tax yield?

4. Suppose that a government cared only about the after-tax income of the very poorest people in the country. Suppose that it was trying to redistribute income by levying an income tax with a constant marginal rate  $t$ , dividing the proceeds equally among all people, so that a person's net income is

$$(1 - t)y + R$$

if her taxable income is  $y$ , and if the per capita revenue from the tax is  $R$ .

Suppose as well that a person's taxable income is defined by equation (\*) in question #3 above. There are many different people, varying in their "original" income  $z$ . In particular, there are some people who have an "original" income  $z$  of zero, although the average original income in the country is some  $\bar{z} > 0$ .

What marginal tax rate  $t$  should the government levy?

5. If a person faced an income tax schedule with a constant marginal rate  $t$ , how would her optimal amount of tax evasion vary with the marginal tax rate  $t$ , in the following situation?

If she evades any income tax, the probability that she is caught is some constant  $\rho < 1$  ( which does not depend on the tax rate, nor on the amount of underreporting that she has done ).

If she is caught, she must pay the tax owing on the income she has underreported plus a penalty which is proportional to the tax owing, and to the amount underreported. That is, if she owes  $tE$  in tax on  $E$  dollars of underreported income, and if she is caught, she must pay the tax owing, plus a penalty of  $\alpha E$  times the tax owing, where  $\alpha > 0$ .