UNIVERSITY OF OSLO
DEPARTMENT OF ECONOMICS

Problem 1 (weight 35%)

Consider the following economy. Total output from production is $f(k)$ where k denotes the capital used in the country and f is the macro production function with $f' > 0$, $f'' < 0$. Denote by c the capital owned by domestic citizens. Assume that a tax t is imposed on each unit of capital used in the country. Assume that the benefit derived from public expenditures is $G(tk)$. Denote by $\rho = f'(k) - t$ the net of tax return to capital. We assume that capital is mobile across borders such that the amount of capital is a function of t, written as $k(t)$ where $k'(t) < 0$.

Assume that the objective function of the government is

$$\Omega = f(k) - f'(k)\text{k} + \rho c + G(tk)$$

a) Explain this objective function.

Suppose that Ω is maximised with respect to t.

b) Derive and interpret the first order condition of this maximisation problem. (You may reformulate the first order condition if you like.)

Suppose the "world" consists of two countries of the type above, and denote by $\bar{k}$ the aggregate amount of capital. The countries may be labelled 1 and 2, respectively, shown as subscripts for the variables k and t.

c) Explain why the following condition is assumed to hold?

$$f'(k_1) - t_1 = f'(k_2) - t_2 = \rho$$

d) How is the allocation of capital across countries affected by a partial increase in t_1?

Assume that each country chooses its tax rate in a way that leads to a Nash equilibrium. Suppose the countries are identical and set the same tax.

e) Would it be in the mutual interest of the two countries to agree on changing the tax rate that was set in the Nash equilibrium?

Problem 2 (weight 35%)

(a) In the taxation of firms, the concept of an Effective Marginal Tax Rate (EMTR) is, in your curriculum, defined as a fraction,

$$\text{EMTR} = \frac{\tilde{p} - r}{\tilde{p}}.$$

Explain the meaning of the two variables $\tilde{p}$ and r, in general, without reference to details of any tax system. (If you want, you may also define the related variable denoted p, which may be helpful here and in the discussion of part (d) below.) Explain how the EMTR, defined in this way, can be used to measure distortions from taxation.

(b) One could instead use an Effective Average Tax Rate (EATR) to measure distortions from taxation. Discuss whether there are circumstances in which an EATR would be a more appropriate measure.

(c) Discuss the statement: "In order to calculate one of the two effective tax rates, EMTR or EATR, one needs the profitability of the firm as an input in the calculations. This is an argument for not using that effective tax rate as a measure for distortions."

(d) The relation between the two rates is given in your curriculum as a weighted average, which can be written as

$$\text{EATR} = w \cdot \text{EMTR} + (1 - w) \cdot T,$$

where w and $1 - w$ are weights, both in the interval $(0,1)$, while T is described as the corporate statutory tax rate adjusted for personal taxes. Explain what happens to the EATR in the two limits, $w \to 1$ and $w \to 0$, and whether these extreme EATRs could be used as suggested in part (b), to measure distortions.

Problem 3 (weight 10%)

Most financial services are exempt from value added tax (VAT). This practice is currently being reconsidered. Give a brief account of the main arguments that are relevant in an assessment of this VAT exemption.

Problem 4 (weight 20%)

a) Explain what is meant by tax evasion, and give two examples.
b) Present briefly what may be social-efficiency cases for taking measures to limit tax evasion.