UNIVERSITY OF OSLO

Faculty of mathematics and natural sciences

Examination in	MAT 1700 — Introductionary micro and macroeconomics
Day of examination:	10. june 2008
Examination hours:	14.30 – 17.30
This problem set consists of 4 pages.	
Appendices:	Formula-sheet
Permitted aids:	None

Please make sure that your copy of the problem set is complete before you attempt to answer anything.

Problem 1 Microeconomics Weight 33%

Assume that a consumer's utility is expressed as

$$u(x_1, x_2) = x_1 + x_1 x_2 + x_2$$

and that the price per unit x_1 is $p_1 = 10$, price per unit x_2 is $p_2 = 20$ and that income (m) is 210.

(a) Find the consumer's optimal consumption bundle.

(b) Based on the utility-function in (a), show that the demand for the goods is given by

$$x_1 = \frac{m - p_1 + p_2}{2p_1} \quad \text{og} \quad x_2 = \frac{m - p_2 + p_1}{2p_2}$$

(c) Explain the notion of normal and inferior goods. Based on the demand-functions in (b), are the two goods normal or inferior?

(d) Explain the notion of complimentary and alternative (substitute) goods. Based on the demand-equations in (b), can the two goods be described as either complimentary or alternative (substitute) goods?

(Continued on page 2.)

Problem 2 Microeconomics Weight 33%

Consider the following product-function

$$y = F(L, K) = L^{\alpha} K^{b}$$

where y is units produced, and L and K represent the input-factors.

(a) Explain the product-function's return to scale characteristics. Also, explain the terms increasing, diminishing, and constant returns to scale.

(b) Assume the product-function $Y = F(L, K) = L^{0,30} K^{0,20}$. What are the function's return to scale characteristics?

(c) Assume the product-function in (b), that the price per unit L is $\omega = 3$, that the price per unit of K is given by $r = 2$, and that the cost-budget (constraint) is $C = 1000$. State the producer's maximization-problem in this case, and calculate optimal amounts of factor-input.

(d) Assume the product-function i (b), that the price per unit of $\omega = 3$, and that the price per unit of K is given by $r = 2$. Derive the producer's cost-function and show that the marginal cost, $MC = C^{'}(y) = 10y$.

(Continued on page 3.)

Problem 3 Macroeconomics Weight 34%

Assume the model specified below

$$
\begin{array}{lllll}
(1) & Y & = & C+I+G & \\
(2) & C & = & c_0+c(Y-T) & c_0>0, 0<c<1 \\
(3) & T & = & t_0+tY & 0<t<1 \\
(4) & I & = & b_0-b_1 i+b_2 Y & \mathrm{b}_1>0, 0<b_2<1, c(1-t)+b_2<1
\end{array}
$$

where Y represents the gross national product (GNP), G is public demand for goods and services (equals the sum of public consumption and real investments), C is private consumption, T is net taxes (tax and fees minus welfare payments and other payments) and I is real investments made by private sector. The parameter values of $c_0, c, t_0, t, b_0, b_1, b_2$ are assumed to be known.

Solving the model for Y yields

$$(5) \quad Y=\frac{1}{1-c(1-t)-b_2}\left(G+c_0-ct_0+b_0-b_1 i\right)$$

(a) Based on this model, explain the effects of contractive monetary policy. In this regard, it is assumed that you explain the how the model works - in this problem as well as in the problems that follow.

(b) Show and discuss the effects of reduced taxes (t) on the GNP and the government's overall tax-revenue, T. Explain your answer!

(c) Assume the following, real economic relationships in a closed economy:

$$
\begin{array}{llll}
(1') & Y & = & C+I+G \\
(2') & C & = & 80+0,80(Y-T) \\
(3') & T & = & 100+0,25Y \\
(4') & I & = & 200-25i+0,15Y
\end{array}
$$

with symbols defined as above. Also assume that $G=500$ and $i=5$. Calculate the equilibrium GNP as expressed by Y.

(Continued on page 4.)

Problem 3, con't **Macroeconomics** **Weight 34%**

(d) Assume that normal GNP equals $\bar{Y} = 2100$ under normal economic conditions. Compare the equilibrium-value in (c) with $\bar{Y} = 2100$ and decide how the economy is positioned relative to the business-cycle, ie. in a recession or up-swing.

Also, compute necessary changes in public spending in order for the GNP to equal $\bar{Y} = 2100$. Show also how, alternatively, the Central Bank may change the interest rate such that $\bar{Y} = 2100$.

(Continued on page 5.)