ECO2143 Macroeconomic Theory II
First mid-term examination: February 4th, 2008
University of Ottawa
Professor: Louis Hotte
Time allowed: 1h 20min

Attention: *Not all questionnaires are the same. This is questionnaire* ***A****. On the answer sheet, you must indicate the letter of your questionnaire with the course's number as follows:* ***ECO2143A****. You must answer according to* **the material seen in this course**. *Read all answer choices before choosing your answer.* GOOD LUCK!

QUESTIONNAIRE A

I. MULTIPLE CHOICE QUESTIONS (4 points each)

ATTENTION: To simplify, whenever convenient, today's rich and industrialized countries such as Canada and Western Europe will be referred to as **ICs**, while today's poorer, less-developed countries will be referred to as **LDCs**.

1. Suppose that in Country A, 1/4 of all girls die at age 5 and the remaining 3/4 die at age 100. In addition, suppose that of the women who die at age 100 have, on average, 6 children: 4 boys and 2 girls. What will the net rate of reproduction be?
   (a) 0.5
   (b) 1.5
   (c) 1
   (d) 9

2. Over the past 130 years, the average yearly growth rate of income per capita in Canada and the USA has been approximately (give the closest value)
   (a) -1%
   (b) 0%
   (c) 2%
   (d) 5%
   (e) 8%

3. Which of the following assertions CLEARLY DOES NOT correspond to what you learned in this course?

   Through the history of ICs, population growth has never reached such high levels as observed today in many LDCs partly because
   a) in many LDCs, the mortality rate has fallen *more rapidly* than in the history of ICs.
   b) in many ICs, the fertility rate dropped *before* the drop in the mortality rate.
   c) in many LDCs, the fertility rate does not drop *as much* to compensate for the lower mortality rate.
   d) in many ICs, the factors explaining the drop in the mortality rate occurred in sequence.

4. Which of the following is TRUE?
   a) In LDCs, we typically observe large differences between the *desired* fertility and the *actual* fertility.
   b) In ICs during the 19th century, the drops in fertility rates is mostly explained by the introduction of new contraceptive methods.
   c) When comparing the *desired* fertility and the *actual* fertility in LDCs today, one readily concludes that making new contraceptive methods easily accessible as a highly effective policy to reduce fertility rates.
   d) Because of the suspected strong feedbacks effects, educating girls and giving them access to the labor market can contribute significantly to reducing the fertility rates.

5. Which of the following assertions is *clearly* FALSE.
   a) For Malthus, the only way to improve living standards in the long run is through increased land productivity.
   b) Before 1800, humans generally lived at the subsistence level without much differences through time and places.
   c) The Malthus model does a pretty good job at explaining long run per capita economic growth before 1800.
   d) In Ireland, the introduction of the potato crop from the Americas has not contributed to improving the standards of living, as predicted by the Malthus model.

6. The basic Solow model does a pretty good job at explaining
   a) growth in the long run for ICs.
   b) the high growth rates that Japan experienced during its catch-up phase after the second World War.
   c) why physical capital cannot explain differences in income levels between countries.
   d) the *fundamental* reason why South Korea is rich today while the Philippines is still poor, even though both had similar income levels in 1960.
   e) the link between democracy and economic growth.

7. Suppose that a constant 10% of output is invested, capital stock depreciates at a constant rate of 5% and population grows at a rate of 5%. If the economy exhibits a Cobb-Douglas production function $y = Ak^{\alpha}$, with $\alpha = 1/3$, $A = 10$ and the current level of capital per worker is $k_0 = 12$, what will happen to per capita income at $t = 1$?
   a) It decreases by 2.9%.
   b) It decreases by 1.2%.
   c) It remains unchanged.
   d) It increases by 1.2%.
   e) It increases by 2.9%.

8. In the economy described by question 7, the per-capita income level in the long run will be equal to
   (a) 22.5
   (b) 31.6

(c) 42.5
(d) 55.8
(e) 58.9

9. According to a recent study on the evolution of income inequalities between all persons in the world since 1820, it appears that
   a) World inequalities have increased mainly because of an increase in inequalities between countries.
   b) World inequalities have increased mainly because of an increase in inequalities within countries.
   c) World inequalities have decreased mainly because of a decrease in inequalities between countries.
   d) World inequalities have decreased mainly because of a decrease in inequalities within countries.
   e) World inequalities have remained roughly the same.

10. Which of the following is FALSE. Assuming that the investment rate equals the savings rates, then, according to the basic Solow model, an increase in the savings rate
    a) always increases the long-run income level.
    b) has no impact on the long-run income growth rate.
    c) always increases the long-run consumption level.
    d) always increases the short-run income growth rate.

II. PROBLEMS

(1) **(20 points)** Suppose that there are only two goods produced in the world: computers and ice cream. Computers are traded on the world market but not ice cream. The following table provides information about output quantities and prices for countries A and B.

Country	computers output per capita	ice cream output per capita	price computers local currency	price ice cream local currency
A	12	4	2	4
B	3	1	1	1

a) **(4 points)** Calculate the level of GDP per capita in each country, measured in its own currency.
b) **(4 points)** Calculate the market exchange rate between the currencies of the two countries.
c) **(4 points)** What is the ratio of GDP per capita in country A to GDP per capita in B, using the market exchange rate?
d) **(4 points)** Calculate the PPP exchange rate between the two currencies.
e) **(4 points)** What is the ratio of GDP per capita in country A to GDP per capita in B, using the PPP exchange rate?

(2) **(20 points)** A country has a constant population size of L and aggregate capital stock of K. Aggregate output is given by $Y = AK^{\alpha}L^{1-\alpha}$, where A and α are constant parameter values (i.e. they do not depend on time). The investment and capital depreciation rates are also constant over time and respectively given by $\gamma = 10\%$ and $\delta = 5\%$.

a) **(5 points)** Assuming that $A = 10$ and $\alpha = 1/3$, calculate the long-run per-capita income level y^{ss}. (Always make sure to show all the important steps involved in your calculations. The correction is based on the solution procedure, not the final answer.)
b) The economy is presently at its steady-state equilibrium. Suppose that there is a one-shot, sudden influx of immigrants such that the new *constant* population size L' is now twice as large, i.e. $L' = 2L$.
   i) **(5 points)** Show that in the short-run, the immediate effect is to lower the per-capita capital stock by half and calculate the short-run, immediate effect on per-capita income. Is it reduced by more, less or exactly half? Explain why.
   ii) **(5 points)** Calculate the long-run (steady-state) effect of this immigration influx on per-capita income. Interpret.
c) **(5 points)** Some studies have shown that a larger population size has the advantage of increasing the creation and circulation of ideas. This would imply that with a larger population size, *all else equal*, each worker can do more with any given capital stock. For our purpose, this implies that the value of A is a function of L. More concretely, let us say that

$$A = 10 \quad \text{if} \quad L_t = L,$$
$$A = 20 \quad \text{if} \quad L_t = 2L.$$

Using those values for A, compare the long-run per-capita income levels with population sizes L and $2L$. Discuss the implications for immigration policy.