ECO2143 Macroeconomic Theory II
First mid-term examination: January 31st, 2011
University of Ottawa
Professor: Louis Hotte
Time allotted: 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)

1. Which of the following is generally **true**?
   (a) Market exchange rates between countries help us best understand relative standards of living between countries.
   (b) Adjusting exchange rates with Purchasing Power Parity (PPP) seems to make poorer countries appear wealthier because the differences in prices of internationally tradable goods is taken into account.
   (c) Adjusting for PPP makes rich countries look richer because the relative prices of non-tradable goods are taken into account.
   (d) PPP adjusted rates of exchange between countries take into consideration the fact that non-tradable goods are relatively less expensive in poor countries than in rich countries.
   (e) Calculating the worldwide number of people living on less than $1/day will be lower when using market exchange rates rather than with PPP adjusted rates.

2. Minutes before addressing his nation, a country's President has asked you to quickly calculate how long it will take for his country's GDP/capita to double. His assistant provides you with the fact that, over the past 10 years the country's GDP/capita growth averaged 4.0% per year. Assuming that the country will continue on this growth path, what should you tell the president?
   (a) 40 years
   (b) 7 years
   (c) 9 years
   (d) 10 years
   (e) 18 years

3. Assume that China's GDP grows at a rate of 8% annually, and the USA's at 2.5%. Suppose that in 2010 the GDP of the two countries were 6 trillion and 14 trillion respectively. At these growth rates, in what year can we expect to see China's GDP equal that of the USA?
   (a) 44 years
   (b) 16 years
   (c) 10 years
   (d) 32 years
   (e) 25 years

4. Assume that the GDP/capita for the country of Coronado in 1900 was $5,885. Also assume that in the year 2010, the GDP/capita of this country was $52,150. Using the growth rate of income per capita over this period, what is the projected GDP/capita of Coronado in 2050?
   (a) $115,149/capita
   (b) $156,038/capita
   (c) $74,482/capita
   (d) $90,980/capita
   (e) $98,809/capita

5. Suppose a country's economy follows a Cobb-Douglas production function per worker $y = Ak^\alpha$ where $\alpha = 1/3$ and $A = 10$. Moreover, the depreciation and investment rates are respectively $\delta = 6\%$ and $\gamma = 6\%$. Also assume that capital per worker at period 0 is $k_0 = 12$. What is the percent change in the level of capital per worker between period 0 and period 1?
   (a) Remains unchanged
   (b) Increases by 5.4%
   (c) Decreases by 2.4%
   (d) Increases by 7.4%
   (e) Increases by 1.7%

6. Find the steady-sate income per capita for an economy with a Cobb-Douglas production function $y = Ak^\alpha$ where $\alpha = 1/3$ and $A = 10$ and the depreciation and investment rates are respectively $\delta = 7\%$ and $\gamma = 5\%$.
   (a) 2.15
   (b) 19.1
   (c) 26.7
   (d) 35.8
   (e) 52

7. Which of the following statements regarding savings rates in the Solow model (where the investment rate equals the savings rate) is **false**?
   (a) An increase in the savings rate leads to a higher steady state level of capital per capita.
   (b) A higher savings rate leads to higher output per capita in the long-run which necessarily leads to higher levels of consumption.
   (c) An increase in the savings rate always increases the short-run income growth rate.
   (d) A decrease in the savings rate will lead to a lower long-run level of income per capita.

(e) A change in the savings rate has no impact on the long-run growth of GDP/capita.

8. 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.

9. Suppose that there are only two goods produced in the world: computers and ice cream. Computers are traded on world markets 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	4	10	3$A	4$A
B	2	5	2$B	1$B

What should the PPP exchange rate be between the two currencies?
   (a) 0.173$B/$A
   (b) 0.250$B/$A
   (c) 0.346$B/$A
   (d) 0.666$B/$A
   (e) 1.500$B/$A

10. In question 9, what is the GDP ratio (Y_B/Y_A) between country A and country B using the market exchange rate?
   (a) 0.500
   (b) 0.692
   (c) 0.115
   (d) 0.173
   (e) 0.260

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II. PROBLEM

You must answer the following questions strictly within the space provided. Your answers must be accompanied with clear explanations. Graphs and equations without explanations will not get you far.

The Solow model (60 points) Suppose that at any period t, the aggregate output of an economy (Y_t) depends on the total amounts of workers (L_t) and (physical) capital (K_t) only. This is represented by function F as follows: $Y = F(K, L)$, where subscripts t are removed for simplicity.

a) (10 points) Propose a property for function F which allows us to say that the output per worker (y) depends only on the amount of capital per worker (k), that is, $y = f(k)$. Demonstrate why.

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b) (25 points) Suppose that at every period, workers invest a constant proportion $\gamma \in (0,1)$ of their income into increasing the capital stock but that the capital stock depreciates linearly at constant rate $\delta \in (0,1)$. With the help of a graphic, describes the mechanism through which the economy will reach a steady-state in the long run. What is the assumption that must be imposed on function $f(k)$ that insures the existence of a steady state?

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c) (25 points) Suppose that up to time $\bar{t}$, the economy was operating at its long-run steady state values corresponding to an investment rate γ_1. At $\bar{t}$, the saving rate suddenly jumps to $\gamma_2 > \gamma_1$. Draw a graphic describing the evolution of income per worker over time and discuss the effects on the growth rate.

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