ECO2143 Macroeconomic Theory II
final examination: July 31st 2014
University of Ottawa
Professor: Louis Hotte
Time allotted: 3 hours

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. Calculator permitted.* GOOD LUCK!

QUESTIONNAIRE A
I. MULTIPLE CHOICE QUESTIONS (2 points each)

1. According to the *permanent income hypothesis*,
   (a) consumers act as if their income level were constant throughout their lifetime.
   (b) present consumption is not affected by future income levels.
   (c) people are not forward-looking in making their consumption decisions.
   (d) consumers' income does not change over their lifetime.

2. According to a paper published by Gauti B. Eggertsson in 2008 in the *America Economic Review*, the end of the Great Depression that began in March 1933 in the USA can be mostly attributed to
   (a) an increase in government spending in March 1933.
   (b) an increase in the money supply in March 1933.
   (c) the beginning of the second world war.
   (d) a reduction in the government deficit.
   (e) a sudden shift in expectations.

3. According to a paper published by Gauti B. Eggertsson in 2008 in the *America Economic Review*, during the Great Depression of the 1930s in the USA,
   (a) the increased deficit under President Hoover was deliberate.
   (b) the increased deficit under President Roosevelt was deliberate.
   (c) both Presidents tried to lower the deficit.
   (d) the increased deficit under President Roosevelt is mostly explained by the drop in output.
   (e) President Hoover tried to lower the deficit with lower taxes.

4. When the yield curve on government bonds is increasing with the maturity, this indicates that
   (a) investors in general expect the government to run higher deficits.
   (b) investors in general expect the government to run lower deficits.
   (c) investors in general expect long-run interest rates to decrease.
   (d) investors in general expect short-run interest rates to increase.
   (e) investors are pulling out of the bond market.

5. The recession that began in the third quarter of 2008 in Canada is mostly attributed to
   (a) the bursting of the Canadian housing bubble.
   (b) the weakness of the Canadian banking industry.
   (c) the concerted actions by the OECD countries.
   (d) Jim Flaherty's projected deficits.
   (e) the drop in the demand for exports of Canadian goods and services.

6. We are at the beginning of year t. Government bond A has a two-year maturity, it promises to pay $100 in two years from now (with no other payment), and can be bought today at the price of $90. Its corresponding yield to maturity is denoted i_{2t}. What is the yield to maturity i_{2t} equal to? (assume no uncertainty)
   (a) 3.09%
   (b) 5.41%
   (c) 7.73%
   (d) 10.00%
   (e) 11.11%

7. Along with government bond A described in question 6), one can also buy government bond B that has a one-year maturity, that promises to pay $100 in one year from now (with no other payment), and that can be bought today at the price of $97. Its corresponding one-year yield is denoted i_{1t}. The expected one-year yield for next year is denoted $i_{1,t+1}$ What is the expected yield of a one-year bond for next year $i_{1,t+1}$ equal to? (assume no uncertainty)
   (a) 3.09%
   (b) 5.41%
   (c) 7.73%
   (d) 10.00%
   (e) 11.11%

8. You have an investment project which requires the building of a factory at a cost of $X. From this project, you expect to receive a net profit of $500,000 one year from now and $700,000 two years from now. After that, the factory is closed down and no additional cost or benefit is incurred. Your best alternative use for your money are government bonds for which the one-year yield to maturity is 3% and the two-year yield to maturity is 5%. What is the maximum amount X that you would be willing to pay to build the factory?
   (a) $1,111,111
   (b) $1,120,357
   (c) $1,145,254
   (d) $1,152,103
   (e) $1,200,000

9. Which of the following four statements is clearly FALSE?
   (a) In terms of percentage variations, investment tends to be more volatile than consumption.
   (b) In absolute terms, investment and consumption contribute about equally to GDP fluctuations.
   (c) A drop in government bond yields tends to increase current investment levels.
   (d) When the yield curve for government bonds is upward sloping, this suggests that investors are expecting future short-term interest rates to go up.
   (e) All of the above are true.

10. Suppose that a country experiences a large reduction in its capital stock due to a military conflict. Assume no other effect from the conflict. Within the context of the basic Solow model, once the conflict has ended, which of the following is likely to occur as the economy adjusts to this situation? (Assume no productivity growth.)
    (a) Zero growth for some time, followed by a gradually increasing growth rate.
    (b) A relatively high growth rate for some time.
    (c) A relatively high growth rate in the long run.
    (d) Positive growth, followed by negative growth, and then zero growth.
    (e) none of the above

11. Assume two countries (1 and 2) have the same values of A (a constant productivity level) and γ (investment as percentage of output). Country 1 has a depreciation rate $\delta = 0.05$ and population growth $n = 0.025$. Country 2 has a depreciation rate $\delta = 0.06$ and population growth $n = 0.03$. Noting these differences, what can be said about their relative steady state levels?
    (a) Country 1 has a lower steady state stock of capital per capita.
    (b) Country 2 has a higher steady state level of income per capita.
    (c) There is no difference in their steady state levels of income and capital per capita.
    (d) The growth rates of income per capita at both countries' steady states are equal.
    (e) Not enough information is given to come to any conclusions about relative steady states.

12. Suppose that goods A and B are perfect complements in consumption and are produced with a fixed total labor force size which must be allocated for the production of each good. The rate of technological progress is equal to 2% in sector A and zero in sector B. In the long run, we would expect
    (a) the output of both goods to grow at a rate of 2%.
    (b) the output of good A to grow at a rate of 2% while that of good B does not grow.
    (c) the output of both goods to stop growing.
    (d) all the labor force to be working in sector A where there is higher technological progress.
    (e) an equal distribution of the labor force between both sectors because they are perfect complements.

13. Compared to the growth rate of productivity seen in Canada in the past 50 years or so, how did the growth rate of productivity fare during the peak of the Industrial Revolution (1760-1830)?
    (a) Growth rates of productivity during the Industrial Revolution are comparable to those seen today.
    (b) It was much more robust during the Industrial Revolution.
    (c) It was not possible to measure productivity growth rates during the Industrial Revolution.
    (d) It was weaker during the Industrial Revolution.

14. According to table 7.2 in the textbook, productivity in Canada in 2009 was equal to 88% that of the USA. Suppose that efficiency in Canada is equal to that in the USA and that all productivity growth is caused by technological progress. Based on the growth rate of productivity in the USA of 0.54% per year, how large (in years) would the technology gap between Canada and the USA be?
    (a) 2 years
    (b) 5 years
    (c) 12 years
    (d) 18 years
    (e) 24 years

15. Assume that the relationship between productivity, technology and efficiency is given by $A_t = T_t \times E_t$. Assume that Canada lags 5 years behind the USA in technology. Using the other information provided in question 14, what is then the ratio of efficiencies between Canada and the USA?
    (a) 0.540
    (b) 0.751
    (c) 0.880
    (d) 0.904
    (e) 1.000

You may now go to the washroom before picking up the essay questions.

NAME AND ID:

II. PROBLEM

Answer within the space provided. Your answers must be accompanied with clear explanations. Graphs and equations without explanations will not get you far.

1. (25 points) Capital mobility and economic growth

Assume that the output per capita of a country is given by $y = Ak^\alpha$. (Note that this implies that the marginal product of capital is equal to $\alpha A k^{\alpha-1}$.) A is constant and there is no population growth.

a) **(10)** Assume that the country is CLOSED to the rest of the world such that its capital is NOT mobile. Assuming a savings rate of γ and a capital depreciation rate of δ, derive the long-run output per capita. How does it depend on the savings rate? (To be solved with equations. No graphic.)

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b) **(10)** Assume now that capital is <u>perfectly mobile</u> with the rest of the world. State clearly and briefly what the law of one price for capital movements says. Show that the equilibrium stock of capital is independent of the country's savings rate. (To be solved with equations. No graphic.) Explain intuitively.

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c) **(5)** Does your answer to part (b) imply that countries that save more are no better off than countries that save nothing when capital is perfectly mobile? Explain.

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2. (15 points) We have seen that the current account balance of an open economy was given by the following identity:

(1) $$B_{t+1}^f - B_t^f = rB_t^f + NX_t,$$

where B_t^f denotes net foreign asset holdings, r is the rate of interest on assets, and NX_t is net exports.

a) **(5)** Explain intuitively <u>in words only</u> what identity (1) signifies.

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b) **(10)** Is it always better to have a positive current account balance? Answer from the perspective of Canada's experience over the past 60 years or so.

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3. Technological progress and economic growth (30 points)

Suppose that the national output of an economy is given by the following function:

$$Y = AK^\alpha L^{1-\alpha} = K^\alpha (eL)^{1-\alpha}$$

where the variables are as defined in class and $e = A^{\frac{1}{1-\alpha}}$. (The time subscripts have been removed for clarity.) The total investment and depreciation levels are given by $I = \gamma Y$ and $D = \delta K$ respectively, with $\gamma \in (0,1)$ and $\delta \in (0,1)$. Population (L) and total factor productivity (A) grow at constant rates n and $\hat{A}$ respectively. Let eL denote the total quantity of "effective workers" available in this economy.

a) (15 points) Derive an expression for the steady-state output per effective worker. At what rate is the output per worker growing in this steady-state?

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b) (5) Explain briefly (in words only) how it is possible that output per worker be growing at a faster rate than $\hat{A}$.

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c) **(10)** Suppose that in 1950, productivity growth jumps from $\hat{e}_1$ to $\hat{e}_2$, with $\hat{e}_1 < \hat{e}_2$. Assuming that the economy was in steady-state before 1950, show graphically how the output per worker will change over time after 1950 and explain.

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