Midterm 1, Spring 2017, Econ 100B (Prof. Olney)

Question 1 (10 points, 7 minutes)
The GDP accounting system designed in the 1930s was influenced by the Keynesian model of employment. Suppose instead the design of the GDP accounting system had been influenced by the Solow growth model. Think about one change you would expect to see in how a particular activity is recorded in the GDP accounts if the design of the GDP accounting system had been influenced instead by the Solow growth model.

What is the activity you will discuss in this answer? How would the activity be recorded under the current system? How would it be recorded if the GDP accounting system had been influenced by the Solow growth model? Explain why the activity you chose would be recorded differently if the design of the GDP accounting system had been influenced instead by the Solow growth model.

Question 2 (8 points, 5 minutes)
How is this activity recorded in the GDP expenditure accounts of Japan? All activity takes place within the same calendar year. Briefly defend your answer.

> A Japanese resident purchases clothing at a department store in Tokyo, Japan for 10,000 yen.
> The clothing was manufactured in China and purchased by the department store for 4,000 yen.

Question 3 (10 points, 7 minutes)
Derive the expression for the value of the capital-output ratio in balanced growth equilibrium. Show all your steps.

Question 4 (10 points, 7 minutes)
Suppose that the production function is

$$\frac{Y}{L} = \left(\frac{K}{L}\right)^{\alpha} (E)^{\beta}$$

where the parameters α and β are constant, $0<\alpha<1$ and $\alpha + \beta = 1.2$. Derive the expression for the growth rate of output per worker in balanced growth equilibrium. Show all your steps. In this case, will the growth rate of output per worker be equal to, less than, or greater than the growth rate of efficiency in balanced growth equilibrium?

Question 5 (7 points, 5 minutes)
What does it mean for there to be "diminishing returns to investment in capital"? Include a numerical example in your answer to aid your explanation.

Question 6 (19 points, 14 minutes)
Suppose the economy can be defined by the following (three versions):

$s = 36\ \%$
$n = ½\ \%$
$g = 2\ \%$
$\delta = 1\ ½\ \%$
$\alpha = 1/3$
E_0 (initial value of E) = 1,000

a. (15 points) In BGE, what are the values of K/Y, Y/L, and K/L when $E = E_0$? If you cannot complete the math without a calculator, goes as far as you can to receive the most partial credit. Please put a box around each answer.

b. (4 points) Provide an expression (but do not evaluate it) that shows the BGE values of Y/L and K/L after 10 years.

Question 7 (24 points, 15 minutes)
Consider two economies – Economy A and Economy B – that are initially in BGE. Both economies have the same production function. Initially both economies have the same levels of output per worker. Then war between Economy A and Economy B begins. The battles of the war take place only in Economy A, destroying much of its capital stock. In both economies, about 1 percent of the labor force is killed in the war. Assume that there is no change to the saving rate as a result of the war. Assume efficiency (E) is constant in both economies.

A. (12 points) After the war ends, is Economy A in BGE? Is Economy B in BGE? Defend your answers.

Draw a graph that shows the determination of the pre-war and post-war K/L and Y/L for Economy A and Economy B. Label everything clearly, using subscript "0" to denote the common pre-war position, subscript "A" to denote postwar economy A and subscript "B" to denote postwar economy B.

B. (12 points) Suppose that natural population growth is endogenous: in both economies, natural population growth decreases as output per worker increases. Explain why the war will therefore cause the economies of these two countries to diverge. Illustrate your answers in the graph above. Continue using subscripts "A" and "B" to distinguish between the two economies. Use superscript "*" to denote the BGE positions.

Question 8 (12 points, 7 minutes)
Thomas Piketty and Gabriel Zucman (*QJE*, 2014, Figure IV) provide us with these estimates of the capital-output ratio for the U.S. and Europe for 1870 to the present (see graph). Give two reasonable suggestions of what might have caused the drop in the capital-output ratio for Europe after 1910. The first suggestion should assume the European economy was in BGE. The second suggestion should assume the European economy was not in BGE. Relate your suggestions to Chapter 4's long-run growth model.

Capital-Output Ratios, 1870-2010, US & Europe

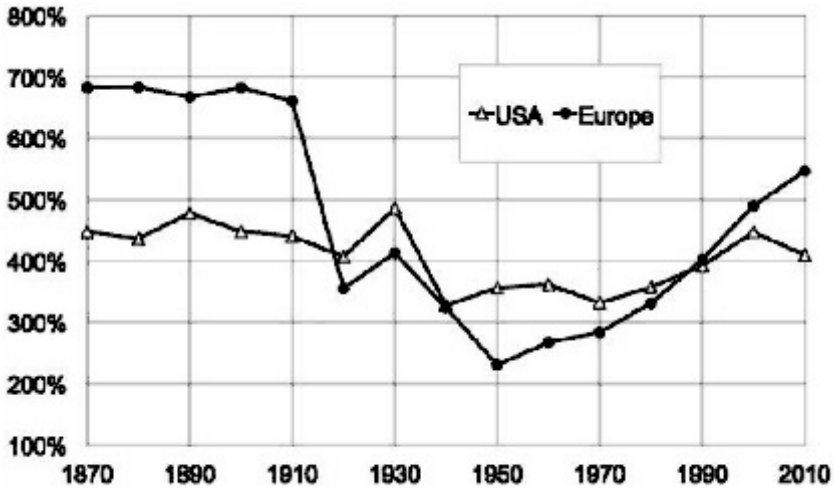

FIGURE IV