

Due Monday, Sep 28

Before you begin writing your answers make sure that you read and fully understand the assignment rules.

Assignment rules:

1. Homework assignments must be submitted at the beginning of the lecture, in class, on the listed dates.
2. Late homework assignments will not be accepted under any circumstances.
3. Submitted assignments must be stapled. Non-stapled assignments will receive a maximum grade of 75%. A non-stapled homework will be graded as normal and then the grade will be multiplied by 75%.
4. Assignments must be typed, except graphs and formulas or they will receive a maximum grade of 75%. Otherwise, the homework will be graded as normal and then the grade will be multiplied by 75%.
5. In all the questions you are required to show the way you got to the solution. Presenting only the final answer, without showing your work will result in zero points for that question, even if the answer is correct.
6. In order to receive full credit, all diagrams must be fully labeled. That is, you are required to give a title to each diagram and label the axis.
7. You are encouraged to collaborate on the homework assignments, but submitted work must be your own. This means that you should write your answers independently. On each assignment you are required to note the names of your collaborators. NOTE: Turning in identical homeworks will result in a zero for both parties.
8. No emailed homeworks will be accepted unless prior authorization is acquired from the instructor
9. We all make mistakes (yes, even the instructors). For each substantive mistake found in this homework, a student first to report it will be rewarded with 5 points on top of his/her score for the homework (out of 100).

Total 100 possible pts

Data Analysis [30 pts]

1. (15 pts) Go to the Penn World Table (PWT) website. Consider the following countries: France, Japan, Ecuador, Brazil, Chad, and Kenya. For each country determine the following between 1960 and 2000 (you do *not* need to submit your data):

- real GDP per capita (using “Constant Prices: Laspeyres” series)
- investment share of real GDP per capita
- population growth rate (you will need to calculate this yourself)

- a. (12 pts) For each country, plot the following graphs:

- Real GDP per capita against investment share
- Real GDP per capita against population growth rate

Note: You should have 12 graphs in total. Submit your graphs (be sure to label).

- b. (3 pts) What can you observe in the data and graphs about the relationship between real GDP per capita and investment? What about between real GDP per capita and population growth rate? Are the relationships you observe consistent with the Solow Model? Explain.

2. (15 pts) Go to the Penn World Table (PWT) website. Consider the following countries: Japan, USA, Italy, Australia, France, and Belgium.

- a. (6 pts) For each country calculate the growth rate of real GDP per capita from 1950 to 2000. Then, for each country, find the average growth rate for that period (you do *not* need to submit your data). Fill in the following table:

Country	Real GDP per Capita in 1950	Average Growth Rate (1950-2000)
Australia		
Belgium		
France		
Japan		
Italy		
USA		

- b. (4 pts) On one graph, plot the average growth rates of these countries against the levels of real GDP per capita in 1950. Submit the graph. Clearly label your graph.
- c. (5 pts) If the graph in part (b) were your only evidence, what would your conjecture be as to why some countries in the sample could grow faster than others? Explain. Is your observation consistent with the Solow Model?

Basic Solow Model [70 pts]

3. (20 pts) Consider a country where the savings rate is 16%, while the capital income share is $1/3$. Take the depreciation rate to be 1% and the population growth rate to be 3%. Answer the following questions:
 - a. (10 pts) Derive the equation for the steady state level of per capita GDP in this economy. Calculate it with the parameters given.
 - b. (5 pts) According to the basic Solow Model, what would be the savings rate needed for the country to double its steady state level of per capita income?
 - c. (5 pts) According to the basic Solow Model, what would be the population growth rate required to double the country's steady state level of per capita income?
4. (30 pts) Comparative statics: Consider two countries with the same population growth rate, the same savings rate, the same factor income shares, and the same rate of depreciation.
 - a. (10 pts) If country A is currently richer (i.e. has a higher level of capital per worker) than country B, which country has a higher growth rate of GDP per capita? Explain.
 - b. (10 pts) Suppose country A has a higher income tax rate than the country B. If all the tax revenues are spent on wasteful spending by the government, which country will have a higher standard of living in the long run? Explain.
 - c. (10 pts) Same as part (b), except that now all the tax revenues are spent on investment. Which country will have a higher standard of living in the long run now? Explain.
5. (20 pts) Simulating Transition Dynamics: Suppose that $Y = K^{1/3}L^{2/3}$, $s = 0.3$, $n = 0.03$, and $\delta = 0.01$. Let $k_0 = 100$.
 - a. (10 pts) Derive the discrete time version of the equation for the law of motion of capital in the Solow Model.
 - b. (10 pts) Using part (a), calculate what would be the values of per capita y and k five and ten periods forward (you may want to do this in Excel).