Problem Set #2 – ECON 3311, Spring 2025 **[Answer Key]**

Due: 2/24 at 11:59PM (via eLearning)

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1. Suppose the production function of an economy is given by $Y = \bar{A}K^{1/4}L^{3/4}$

a. Calculate GDP per capita (y) as a function of $\bar{A}$ and k?

b. Does the production function display constant, decreasing, or increasing returns to scale?

2. The following table depicts observed GDP per capita and predicted GDP per capita for several countries relative to the US:

Production Model's Prediction for per Capita GDP (U.S. = 1)

	Observed per capita GDP	Predicted per capita output, $y_P = k^{1/5}$
Burundi	0.02	0.19
Brazil	0.29	0.74
Switzerland	1.21	1.12
China	0.24	0.67
Spain	0.63	1.03
United Kingdom	0.75	1.04
India	0.10	0.47
Italy	0.68	1.10
Japan	0.68	0.95
South Africa	0.23	0.63

Source: Penn World Table 9.0.

a. Does the production function $y = k^{1/5}$ (shown in the table) generally underestimate or overestimate actual GDP per capita? What part of the production function do we usually assume explains these differences in predicted versus actual GDP?

b. What are two reasons why the production function in part 'a' tends to not accurately= predict GDP per capita? (Hint: we went over three reasons in class).

c. Calculate the production function (Y) as a function of K and L?

3. State whether the following statement is true or false and provide a brief explanation and example:
"In a Cobb-Douglas production function, it is possible for a production function with constant returns to scale to have diminishing marginal product of labor and diminishing marginal product of capital."

4. **Suppose you are given the following data for Cameroon:**
   Observed per capita GDP, relative to the United States, is 0.01
   Predicted per capita GDP, given by $y_P = k^{1/2}$, is 0.18.
   Provide an estimate of total factor productivity (A).

ounded to.

5. **Suppose we are interested in estimating the effect of different institutions that a nation adopts on economic growth. Why can't we simply compare the different outcomes of any two countries (e.g. Venezuela and Canada) that have different institutions? Briefly explain.**

6. **Suppose the production function of a country is $Y = 2K^{1/4}L^{1/4}$**

   a. **What does the 2 in the production function represent?**

   b. **What is the marginal product of labor (MPL) equal to? Why is the optimal number of workers that should be employed obtained by setting MPL = w**