Problem Set 2.
Due Date: End of Lecture on Wednesday September 28

I. A country is described by the Solow model, with a production function of $y=k^{\alpha}$ and α is equal to one-half. Suppose that k is equal to 400. The fraction of output invested is 50%. The depreciation rate is 5%. Is the country at its steady-state level of output per worker, above the steady state, or below the steady state? Show how you reached your conclusion.

II. In a country the production function is $y=k^{1/2}$. The fraction of output invested, γ, is 0.25. The depreciation rate, δ, is 0.05.

i. What are the steady state levels of capital per worker, k, and output per worker, y?

ii. In year 1, the level of capital per worker is 16. In a table like the following one, show how capital and output change over time. Continue this table up to year 8.

Year	Capital	Output	Investment	Depreciation	Change in k
	k	y	γy	δk	$\gamma y - \delta k$
1	16	4	1	0.8	0.2
2	16.2				

iii. Calculate the growth rate of output between years 1 and 2.

iv. Calculate the growth rate of output between years 7 and 8

v. Comparing your answers from parts c and d, what can you conclude about the speed of output growth as a country approaches its steady state?

III. Suppose that there are no investment flows among countries, so that the fraction of output invested in a country is the same as the fraction of output saved. Saving in an economy is determined as follows: There is a subsistence level of consumption per worker, c^*. If income per worker is equal to c^*, people will consume all of their income. All income per worker in excess of c^* will be split between consumption and investment, with a fraction γ going to investment and the rest going to consumption. Use a diagram to analyze the steady states of this economy.

IV. Consider a country described by the Solow Model where the growth rate of population is endogenous. In fact population growth is such that:

$$n_H > n_L$$
$$n = \begin{cases} n_H \text{ if } y < \bar{y} \\ n_L \text{ if } y \geq \bar{y} \end{cases}$$

The production function is standard: $y = k^{\alpha}$, and capital depreciates at a rate δ. Investment is a constant fraction γ of income and exogenous. *Hint:* $\bar{y} = \bar{k}^{\alpha}$

i. Draw a possible configuration showing a single global steady state and another showing multiple steady states.

ii. For what range of values of the investment rate will there be a single steady state, and for what range of values will there be multiple steady states?