Economics 362, Intermediate Macro, Hanes
Second problem set on Solow Model

Consider an economy with a rate of population growth n, a depreciation rate δ , and a savings rate s. (n, δ , and s are all fractions.)

The aggregate production function is: $Y = K^{1/3}L^{2/3}$

1) Use algebra to get the "per worker production function" $y = f(k)$

2) Write an equation that gives the change in capital per worker Δk as a function of k, n, δ , and s . Remember to account for n!

3) In the long-run steady state, $\Delta k = 0$. Using this fact and your answer to b), use algebra to get an equation that gives the LRSS value of capital per worker, denoted k^*, as a function of n, δ , and s . Remember to account for n!

4) Using your answer to 3), explain what happens to k^* if the savings rate s increases from a low value s_0 to a higher value s_1.

5) In a graph, show what happens to the economy if the savings rate s increases from a low value s_0 to a higher value s_1. In words, explain how you get from the "short run" immediately after the increase in s to the "long run" many years after the increase in s.

6) With this aggregate production function, the marginal product of capital, which is equal to the slope of the "per worker" production function $f(k)$, is:

$$\frac{\partial f(k)}{\partial k} = \frac{1}{3}k^{-2/3}$$

What is this MPK equal to if the economy is in the "Golden Rule" state?

7) Using algebra, find the Golden Rule value of capital per worker k^*_{gold} as a function of n and δ .

8) Draw a graph that shows an economy where the savings rate is *too low* to achieve k^*_{gold}. Make sure that you mark k^*_{gold} on the graph, and draw the graph so that the economy's LRSS consumption per worker c^* is less than the golden rule value c^*_{gold}.