

## Assignment II

### Question 1: Solow and the Cobb Douglas

Given the Solow growth mode, suppose that the production function is Cobb-Douglas.

1. Find expressions for  $k^*$ ,  $y^*$ , and  $c^*$  as functions of the parameters of the model,  $s, n, \delta$  and  $\alpha$ .
2. What is the golden-rule value of  $k$ ?
3. What saving rate is needed to yield the golden-rule capital stock?

### Question 2: Factor Payments in the Solow Model

Assume that both labor and capital are paid their marginal products. Let  $w$  denote  $\partial F(K, AL)/\partial L$  and  $r$  denote  $[\partial F(K, AL)/\partial K - \delta]$ .

1. Show that the marginal product of labor  $w$ , is  $A[f(k) - kf'(k)]$ .
2. Show that if both capital and labor are paid their marginal products, constant returns to scale imply that the total amount paid to the factors of production equals total net output. That is, show that under constant returns,  $wL + rK = F(K, AL) - \delta K$ .
3. The return to capital ( $r$ ) is roughly constant over time, as are the shares of output going to capital and labor. Does a Solow economy on a balanced growth path exhibit these properties? What are the growth rates of  $w$  and  $r$  on a balanced growth path? Explain.
4. Suppose the economy begins with a level of  $k$  less than  $k^*$ . As  $k$  moves toward  $k^*$ , is  $w$  growing at a rate greater than, less than, or equal to its growth rate on the balanced growth path? What about  $r$ ? Explain.