Problem Set

MA17Q4-F

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[1] Solow Model (cont'd)

Let $0 < \alpha < 1$. Consider the Slow model with the following production function $y = k^{\alpha}$. Let δ, g, n, s be the standard parameters.

1. Derive the formula for the steady state capital stock k^*, for which $sf(k^*) - (\delta + g + n)k^* = 0$ is met.
2. Derive the formula for the golden-rule capital stock k_G^*, for which $f'(k_G^*) = \delta + g + n$ is met.
3. What saving rate, s_G, must the economy have to achieve the golden-rule capital stock as its steady state? (If $s = s_G$, $k^* = k_G^*$ holds.)

[2] Mankiw–Romer–Weil Model

Let $0 < \alpha < 1$ and $0 < \beta < 1$ with $\alpha + \beta < 1$. The output is given by

$$Y = K^{\alpha} H^{\beta} (AL)^{1-\alpha-\beta}.$$

Capital accumulation equations are given by

$$\dot{K} = s_k Y - \delta K, \qquad \dot{H} = s_h Y - \delta H,$$

where they assume K and H have the same depreciation rate, δ. Define $y = Y/AL$, $k = K/AL$, $h = H/AL$ and show that the following two-dimensional differential equation system determines the dynamics of the model:

$$\dot{k} = s_k k^{\alpha} h^{\beta} - (\delta + g + n)k$$
$$\dot{h} = s_h k^{\alpha} h^{\beta} - (\delta + g + n)h.$$

Answer sheet. Please write your name and id number.