Macroeconomic Theory: Assignment 2

Question 1. (20%) Consider a standard growth model we discussed in class. There is a representative household solving the following optimization problem

$$\max_{\{c_t, k_{t+1}\}_{t=0}^{\infty}} \quad \sum_{t=0}^{\infty} \beta^t u(c_t)$$

$$\text{subject to} \quad \begin{cases} c_t + k_{t+1} - (1-\delta)k_t = f(k_t) \\ c_t, k_{t+1} \geq 0 \\ k_0 = \bar{k}_0 \end{cases} \quad , \text{ for } t = 0 \ldots \infty$$

We analyze the dynamic of the economy after an unexpected shock. Suppose that the economy was initially at the steady state. At time T, there is an unexpected, permanent decrease in β.

1. (5%) How do the steady state capital and consumption change as β decreases?
2. (5%) Draw $L_k(k)$ and $L_c(k)$ locus before and after the unexpected shock on the $k - c$ diagram
3. (10%) Plot the optimal path of capital and consumption from the old steady state to the new steady state (where the horizontal axis is time t, and the verital axis is capital or consumption)

Question 2. (20%) Consider a standard growth model we discussed in class. There is a representative household solving the following optimization problem Suppose that the government charges g units of output from each household in each period

$$\max_{\{c_t, k_{t+1}\}_{t=0}^{\infty}} \quad \sum_{t=0}^{\infty} \beta^t u(c_t)$$

$$\text{subject to} \quad \begin{cases} c_t + k_{t+1} - (1-\delta)k_t = f(k_t) - g \\ c_t, k_{t+1} \geq 0 \\ k_0 = \bar{k}_0 \end{cases} \quad , \text{ for } t = 0 \ldots \infty$$

Suppose that $g = 0$ initially, and the economy was at the steady state. At time T, there is an unexpected, permanent increase in g ($g = \bar{g} > 0$.)

1. (5%) How do the steady state capital and consumption change as g increases?

2. (5%) Draw $L_k(k)$ and $L_c(k)$ locus before and after the unexpected shock on the $k-c$ diagram

3. (10%) Plot the optimal path of capital and consumption from the old steady state to the new steady state (where the horizontal axis is time t, and the verital axis is capital or consumption)