Macro Theory B

Home work 0: Dynamic optimization

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The purpose of this exercise is to make sure that you practice the material we covered in the first lecture.

1 Euler conditions

Derive the Euler conditions for the infinite horizon problem described in class when $f(k) = Ak^{\alpha}$ and $u(c) = \log(c)$, i.e.,

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

$$\text{subject to} \quad c_t + k_{t+1} \leq f(k_t) + (1-\delta)k_t,$$

$$k_0 \text{ given},$$

$$\lim_{T\to\infty} \beta^T u_1(c_T)k_T = 0.$$

1. Using the sequential problem (Lagrange)

2. Using the functional equation (Bellman equation)

2 Guess and verify

In class we used the value-function iteration solution method to get an improved guess for the value function. Use the guess and verify method (described in the notes) to find the solution to the problem above.