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Problem Set # 2

Problem 1: Power Utility

Consider an economy with an infinitely lived representative agent. Lifetime utility is given by:

$$\sum_{t=0}^{\infty} \beta^t \Big(\frac{c_t^{1-\gamma} - 1}{1-\gamma} \Big)$$

The economy has Cobb-Dougals production $f(k_t) = k_t^{\alpha}$ and depreciation rate δ.

(a) Write down the representative agent's problem sequentially.

(b) Write down the Bellman equation for the agent's problem.

(c) Assume full depreciation and derive the Euler equation.

(d) Find the steady state values of k, c, and production y.

Problem 2: Cake Eating

(a) Solve the cake eating problem analytically and on the computer. Assume the cake will go bad in 30 periods. Let k_t be the amount of cake and let c_t be the amount of cake you eat in time t. Also assume that the initial size of the cake is $k_0 = 1$ and that you have log utility with a discount factor of $\beta = 0.85$. Submit your code, and plot the size of the cake, consumption, and utility *on the same graph.*

(b) Suppose when you get your cake you put it in the fridge until the next day when you will begin to eat it. Each day after you eat your portion of cake, you put the remaining cake in the fridge until the next day. However, your sister has a condition known as "sleep eating", and every night she sleep walks down to the fridge and eats a fraction s of your cake (including the night before you ate your first piece). Does this change the amount of cake that you eat? Submit your code, and plot the size of the cake, consumption, and utility for $s = 0.01$, $s = 0.10$, $s = 0.20$, and $s = 0.40$