Dynamic Model: Practice Problems
Intermediate Macroeconomics
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Question 1 Consider the following dynamic, two period classical model with a capital market:

The Representative Household has preferences over consumption goods c_1 and c_2 given by the utility function $U(c_1, c_2) = c_1 + \beta c_2$.

The Representative Firm owns a technology represented by the production function $Y^S = 10K^{\frac{1}{2}}$.

a) Define a competitive equilibrium for this economy. Be sure your definition is written in a precise manner.

b) Assuming $\beta = \frac{4}{5}$, $Y_1 = 25$, and $Y_2 = 0$, solve for the competitive equilibrium for this economy.

Question 2 Consider the following dynamic, two period classical model with a capital market:

The Representative Household has preferences over consumption in period 1, c_1, and consumption in period 2, c_2, given by the utility function $U(c_1, c_2) = \ln c_1 + \beta \ln c_2$.

The Representative Firm owns a technology represented by the production function, $Y^S = 20K^{\frac{1}{2}}$.

a) Assuming $Y_1 = 50, Y_2 = 0$, and $\beta = \frac{3}{4}$, solve for the competitive equilibrium for this economy.

b) Now consider a government that taxes the household's period 1 Lucas Tree endowment, Y_1, at the tax rate, τ, where $0 \leq \tau \leq 1$. Assume government waste. What happens in the capital market in this new scenario? Solve for the new competitive equilibrium. The equilibrium values should be in terms of τ.

Question 3 Consider the following dynamic, two period classical model with a capital market:

The Representative Household has preferences over consumption in period 1, c_1, and consumption in period 2, c_2, given by the utility function $U(c_1, c_2) = c_1 + \beta c_2$.

The Representative Firm owns a technology represented by the production function, $Y^S = K^{\frac{1}{2}}$.

a) Assume $\beta = 1$. How do you know the household will not necessarily smooth its consumption? Give a numerical example. What change can you make to the household to make sure it smooths consumption?

b) Assuming $Y_1 = 15, Y_2 = 0$, and $\beta = \frac{1}{2}$, solve for the competitive equilibrium for this economy.