

Homework 4: Theory of Dynamic Programming

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1. SLP ¹ Exercise 5.3 (correction $k^* = \operatorname{argmax}_{k \geq 0} [\beta f(k) - k]$)
2. **(A Tree-Cutting Problem)** SLP Exercise 5.5
3. Consider the following model economy in which capital depreciates fully after two periods, but does not depreciate at all before this. Preference are

$$\sum_{t=0}^T \beta^t \ln(c_t)$$

The technology constraint is

$$c_t + x_t \leq x_{t-1}x_{t-2}$$

where x_{t-1} are the investments (new machines) made in period $t - 1$. Thus in period $t + 1$, the machines accumulated in $t - 2$ have disappeared from the world. Use the D.P. algorithm to solve for value functions V_0, V_1, \dots and their policy function.

4. Show that the Bellman Equation of problem 3 is Contraction.

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¹Stokey, Lucas, Prescott, Recursive Method in Economic Dynamics, 1989