

**Economics 502 Macroeconomics and Growth Theory**  
**Spring 2012**  
**Homework 1**

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Due date: Thursday, February 16, 2012

1. Consider the following “cake-eating” problem. A consumer has preferences given by

$$\sum_{t=0}^{\infty} \beta^t \ln c_t$$

where  $0 < \beta < 1$  and  $c_t$  is consumption. The consumer begins period 0 with  $k_0$  units of consumption goods which can be consumed or stored until next period. Consumption goods are nonperishable. The consumer faces the sequence of constraints

$$c_t + k_{t+1} \leq k_t$$

for  $t = 0, 1, 2, \dots$

- (a) Guess that the value function takes the form  $v(k_t) = A + B \ln k_t$  where  $A$  and  $B$  are constants and verify that the guess is correct.
- (b) Determine the optimal decision rule for  $k_{t+1}$ .
- (c) What paths do  $c_t$  and  $k_t$  follow over time and how does this depend on the discount factor?
2. Chapter 2, #2 (p. 94)
3. Chapter 2, #3 (p. 94)