EC314-Fall 2010
Problem Set 9

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When you write up your answers, your goal should be to (1) be correct, and (2) convince your reader that your answer is correct. Answers which do not achieve these goals will not be awarded full credit. To accomplish the second objective, it is helpful if your work is legible and if all steps are presented, possibly with a line of explanation. **Please STAPLE pages together so that we do not lose them.** *(This problem set updated: 18 August 2010)*.

Problems

1. Consider a forest characterized by;

$$\begin{aligned} p &= \text{price per board foot of lumber} \\ c &= \text{cost of harvesting per board foot} \\ d &= \text{cost to replant the forest} \\ V(t) &= \text{growth equation for trees} \end{aligned}$$

   Suppose that $V(t) = \frac{t}{1+t}$.

   (a) Following the analysis from the text and lecture, find the expression for the present value of the forest conditional on rotation time I.

   (b) Following the analysis from the text and lecture, find the first order condition that determines the rotation time that maximizes the discount present value of the forest.

2. Suppose that

$$\begin{aligned} p &= 2 \\ c &= 1 \\ d &= .2 \\ r &= .1 \\ V(t) &= \frac{t}{1+t} \end{aligned}$$

   Find the approximate optimal rotation period for this forest numerically. That is, find the value of I for which the either the expression for the value of the forest is maximized, or for which the first order condition determining this maximum is most nearly satisfied. You may want to use a computer for this calculation.

3. Using the model developed in chapter 10, and supposing that your forest has the following parameters,

$$\begin{aligned} p &= 11 \\ c &= 1 \\ d &= 10 \\ V(I) &= e^{rI} \end{aligned}$$

   verify that $I^* = 2$ is an optimal harvest period.

4. p. 342 problems 1ab, 4.