

Economics 33530: Assignment 5 Key
(due Friday, November 30)

Professor Jensen

Fall 2007

1. Assume the annual increment of a pine forest as a function of its age t is

$$MP = 1000 + 400t - 30t^2$$

and its mean annual increment is

$$AP = 1000 + 200t - 10t^2.$$

Determine the age A^* at which the flow of wood that can be harvested from this forest over time is maximized.

2. Assume the value of a pine forest as a function its age t is given by

$$V = 400 + 1000t - 10t^2$$

so that its rate of change over time is

$$\Delta V/\Delta t = 1000 - 20t.$$

Also assume the interest rate is $r=0.1$ and the opportunity cost of the land is $OCL = 1585$.

Determine the optimal rotation R^* that maximizes the net benefits of harvesting this forest.

NOTE: Given a quadratic equation of the form $at^2 + bt - c = 0$, where a , b , and c are numbers, there are two solutions (roots) for t , namely:

$$t_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

and

$$t_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$