Forestry 466W
Practice Problem Set 3 - 2015
Forest Value

1. You are in charge of the Transcontinental Paper Company's spruce genetics program in Maine. You have obtained the following yield data from some trials of a new, genetically improved variety of red spruce.

   Table 1. Yields, mean annual increment, and land expectation values for genetically improved spruce plantations at various rotation ages.

Age	Yield (cd/ac)	MAI	LEV
45	48		
50	56		
55	68		
60	77		

   a. Calculate the mean annual increment (MAI) for ages 45, 50, 55, and 60 and fill in the third column in the table. (Don't worry about the LEV column for now.)

   b. What is the average annual compound rate of growth between ages 45 and 55?

   c. Using the yield data in Table 1 and the cost and price data below, calculate the LEV for plantations of the new spruce variety for each rotation (45, 50, 55 and 60 years). Assume all prices and costs will increase at about the same rate as inflation.

   Planting cost: $145/ac
   Release cost at age 4: $45/ac
   Annual taxes: $2/ac·yr

   Spruce pulpwood price: $35/cd
   Real interest rate: 4%

   d. How much must the release treatment increase the value of the harvest at the optimal rotation in order for the treatment to be financially sound.

   e. Assume you have a 25-year-old spruce plantation with the expected yields, costs and prices given in Table 1 and part c. What is the per-acre forest value of the plantation?

2. Consider the value of an acre of forest land under the following assumptions: 1) the only value of the land is for growing timber; 2) the owner's real alternate rate of return is 3%; 3) the best prescription for managing the stand is to thin at age 40 and clearcut at age 75; 4) the yield for the thin is expected to be 12 cords of pulpwood per acre, and the clearcut is expected to yield 10 cords of pulpwood per acre and 14 thousand board feet (mbf) of sawtimber per acre; 5) the real pulpwood stumpage price is expected to be $15 per cord and the real sawtimber stumpage price is expected to be $285 per mbf; 6) it costs $150 per acre to establish the stand; 7) annual taxes and management costs together are $4 per acre, and 8) all prices, costs, and the alternative rate of return are expected to remain constant in real terms.

a. Calculate the land expectation value of this stand.

b. Calculate the forest value of this stand at age 40.

c. Calculate the forest value of this stand at age 70.

4. You own a 40-acre forested tract. You think the stand may be mature and are considering cutting it now. If you do not cut it now, you will probably wait 5 years and then cut it. If you cut the stand now, you estimate that it will yield 4 cords of pulpwood per acre and 11 mbf of sawtimber per acre. If you wait five years, you estimate you will be able to cut 3.5 cords of pulpwood per acre and 13 mbf of sawtimber per acre. Prices, costs, and your real alternate rate of return are the same as in Problem 3. After you cut the stand, you plan to establish a stand just like the one in Problem 3.

a. What is the expected present value of the tract (land and trees) if you cut it now?

b. What is the expected present value of the tract (land and trees) if you cut it five years from now?