Finance 445
Capital Investment and Financing Decisions
Computer Problem Set #3
Due: March 21, 2002

Problem One. In addition to the 2500 acres of land leased for the Black Mountain Ski Resort, U.S. Resorts, Inc. is also considering the purchase of 5000 acres of land from Kentucky Forest Products, Inc. The cost of the land will be $5 million and this land is approximately 20 miles southwest of Black Mountain. Twelve years ago, Kentucky Forest Products planted the 5000 acres with three different types of trees. Information on prices and growth rates are given below. Scott Livingston, senior financial analyst, was given the task of determining if U.S. Resorts should buy the land. To assist Scott in his analysis, he wants you to determine the optimal year to harvest each of the three types of trees. (As in the notes, assume a single harvest of trees with no risk. Your analysis should look like the analysis in the Chapter 6 notes.)

Use these facts for all three types of trees
Annual inflation rate in lumber prices = 3.5%
Discount rate (nominal) = 6%

Tree Type A
Currently 12 years old
Growth rate formula: $120 * (1.5 * \text{age})^{0.50}$
Current price of lumber from Tree Type A = $500 per 1000 board feet

Check figures for Tree Type A (age 12 and age 13)

Age	Board Feet	Price	Sale's Price	PV (6%)	Return
12	509.12	$500.00	$254.56	$254.56	
13	529.91	$517.50	$274.23	$258.70	7.73%

Tree Type B
Currently 12 years old
Growth rate formula: $105 * (\text{age})^{0.38}$
Current price of lumber from Tree Type B = $850 per 1000 board feet

Tree Type C
Currently 12 years old
Growth rate formula: $160 * (\text{age})^{0.57}$
Current price of lumber from Tree Type C = $350 per 1000 board feet

Grading for problem one for each tree type

1. Correctly determine the PV of the sale's price when the tree is 15 years old (1/3 point)
2. Correctly determine the return when the tree is 15 years old (1/3 point)
3. Correctly determine which year the tree should be harvested. Note – the optimal harvest year is in between 12 and 25 years of age for each of the three types of trees. (1/3 point)

Problem Two. If U.S. Resorts decides to buy the 5000 acres of land from Kentucky Forest Products, it will need to borrow the $5 million asking price. The following are four different loan proposals for the $5 million loan. Scott has calculated the NPV for Loan A. Your assignment is to calculate the NPV of each of the three other loan proposals using a 6% opportunity cost of capital. (Hint: calculate the EAC for the loan payments, then use the EAC to convert cash flows to the same dollar amount each year in perpetuity. Use the PV of the perpetual cash flows and the loan amount to calculate the NPV of each of the loan proposals.)

Terms for Loan A
Length = Perpetual
Annual payments = $5 million x 6.20% = -$310,000
EAC = -$310,000
Check figure for Loan A: NPV (at 6%) = +$5,000,000 + (-$310,000 / 0.06) = -$166,666.67

Terms for Loan B
Length = Perpetual
Payments = -$1,300,000 every four years (t = 4, t = 8, t = 12, etc.)
Check figure: EAC = -$297,168.94

Terms for Loan C
Length = Perpetual
Payments = -$50,000 at t = 1, 2, and 3, and -$1,150,000 at t = 4. (Pattern of payments repeats in perpetuity)

Terms for Loan D
Length = Perpetual
Payments = -$50,000 at t = 1, 2, 3, and 4, and -$1,435,000 at t = 5. (Pattern of payments repeats in perpetuity)

Grading for problem two for each loan type (Loan B – Loan D)

1. Correctly determine the EAC of the loan (1/2 point)
2. Correctly determine the NPV of the loan (1/2 point)

Problem Three. Under current plans, Black Mountain Ski Resort will have 60 ski runs. Scott has put together an analysis of the proposed expansion of the ski resort from 60 ski runs to 70 ski runs. Based on this analysis, Scott was planning to reject the expansion project. However, new information has been received that will cause a change in assumptions. Scott wants you to update the analysis with the new assumptions. Here is the old analysis performed by Scott:

Old assumptions

1. Expansion project (t = 0) initial investment cash flow= -$10,000,000
2. Incremental cash flows (each year in perpetuity, starting at t = 1) = $270,000
3. Operation / maintenance costs of existing equipment under normal usage (60 ski runs) cash flow = -$1,019,800 per year
4. Existing equipment life under normal usage = 4 years
5. Operation / maintenance costs of existing equipment under high usage (70 ski runs) cash flow = -$2,000,000 per year
6. Existing equipment life under high usage = 2 years
7. Cost of new equipment cash flow = -$5,000,000
8. Operation / maintenance costs of new equipment under normal or high usage cash flow = -$1,000,000 per year
9. Life of new equipment = 4 years
10. Assume that new equipment is replaced every 4 years in perpetuity with the same cash flows
11. Real discount rate = 2%

Accept expansion project - analysis

1. Initial investment cash flow = -$10,000,000
2. PV of $270,000 = $13,500,000
3. PV of operation / maintenance costs for old equipment (high usage) = -$3,883,122
4. EAC for new replacement equipment = -$2,313,119
5. PV of purchase / operation / maintenance costs for new equipment (high usage) = -$111,164,877
6. Sum of lines 1, 2, 3, and 5 = -$111,547,999

Reject expansion project - analysis

1. PV of operation / maintenance costs for old equipment (normal usage) = -$3,883,122
2. EAC for new replacement equipment = -$2,313,119
3. PV of purchase / operation / maintenance costs for new equipment (normal usage) = -$106,848,209
4. Sum of lines 1 and 3 = -$110,731,331

Difference in present values = -$111,547,999 - (-$110,731,331) = -$816,668

Here are the updated assumptions Scott wants you to use:

1. Expansion project (t = 0) initial investment cash flow = -$10,000,000
2. Incremental cash flows (each year in perpetuity, starting at t = 1) = $400,000
3. Operation / maintenance costs of existing equipment under normal usage (60 ski runs) cash flow = -$1,200,000 per year
4. Existing equipment life under normal usage = 4 years
5. Operation / maintenance costs of existing equipment under high usage (70 ski runs) cash flow = -$1,800,000 per year
6. Existing equipment life under high usage = 2 years
7. Cost of new equipment cash flow = -$3,750,000
8. Operation / maintenance costs of new equipment under normal or high usage cash flow = -$825,000 per year
9. Life of new equipment = 4 years
10. Assume that new equipment is replaced every 4 years in perpetuity with the same cash flows
11. Real discount rate = 3%

Grading for problem three

1. Correctly calculate the EAC for the new replacement equipment (1/2 point)
2. Correctly determine the PV of accepting the expansion project (1/2 point)
3. Correctly determine the PV of rejecting the expansion project (1/2 point)
4. Make a correct recommendation on the expansion project to U.S. Resorts (1/2 point)

Directions

1. This problem set is worth 10 points. You are expected to turn in a professionally written solution to the problem set, including an executive summary (1 – 2 pages) of the problem, your main findings, and recommendations. Supporting analysis should be attached to the executive summary. Two of the ten points are used to grade your presentation. Incorrect conclusions, faulty reasoning, spelling errors, grammatical errors, or poor presentation will result in a reduction in this portion of your score. Eight points are allocated to your numerical solutions and recommendations for project acceptance or rejection. Grading is outlined above. Warning: If you get an "early" answer wrong, it could cause all of your other answers to be incorrect.

2. **For problem one, round all solutions to two decimal places (e.g., $12.34, 12.34%). For problems two and three, round all solutions to the dollar**. You must get the answer <u>exactly</u> correct to receive credit. Remember, answers rounded to too few decimal places are also wrong.

3. You can turn your assignment one day late without penalty, as long as it is turned in <u>before</u> March 22, 2002, 5 p.m. After that time, your score will be reduced by 2 points. Another 2 points will be taken off your score for each additional "school" day the assignment is turned in late. (See syllabus for more details.)

4. Remember you can work together in groups of four, and compare your answers with other groups.

5. Your solutions <u>must</u> be printed on a computer printer or typed.

6. You will be given an opportunity to repeat the assignment for one-half credit (5 points maximum). Of course, this option will only help you if your score is less than 5 points. The makeup assignment will have the same type of problems, but with different assumptions. This opportunity is <u>not</u> available if you turn in the assignment later than 5 p.m., March 22, 2002.