

IEMS 326
Homework 4

Please show all work! See the syllabus for homework policies.

1. Newnan et al., Chapter 9, Problem 60 (p. 316). Use a planning horizon of 30 years. Would your answer change if the planning horizon were infinite? Why or why not?

2. Consider our example of the discounted cashflow analysis of a nuclear power plant (see the lecture7.xls spreadsheet posted before midterm 1). All real cashflows are given in Year-0 dollars. The real costs of building the plant include \$300 million in Year 0 and then \$200 million in Years 1 and 2. The real cost of decommissioning it is \$300 million in Year 40. In Years 3-40, the real cost of operating the plant each year is \$10 million. Assume there will be a constant rate of inflation for the next 40 years.

The nominal discount rate is 13.3%. In Years 3-40, the real price of the electricity sold each year is \$80 million. What is the break-even rate of inflation? When is it economically advantageous to build the power plant: when the inflation rate is higher than the break-even inflation rate, or when the inflation rate is lower? Create a graph of the real NPV (in today's dollars) as a function of the rate of inflation. (Hint: with the nominal discount rate fixed at 13.3%, changing the rate of inflation changes the real discount rate.)

SEE OVER FOR QUESTIONS 3 and 4

These cases contains some information that you don't need and in some places it is ambiguously worded. That is how life usually is. Having studied the case carefully, I believe that you can determine what you need to use and what is the best interpretation of any ambiguous information. So please do not send emails about the interpretation of the case because Yunpeng and I will not answer them. If you want to discuss interpretation of the case, come to office hours with your completed or partially completed work.

3. Do the case "Supersonic Service?"

4. See the case "Pave the Stockpile Area?"

Instead of answering the questions in the case, answer the following questions, using a real discount rate of 7%. For this case only, you do *not* have to show all work. Instead, put your effort into a well-written explanation of your conclusions and your interpretation of the information you were given in the case, and well-formatted figures.

4a) Using the base projections, what is the NPV of the project? What is its IRR?

4b) For each of the 7 variables in Table 15-2 in the case, graph NPV vs. the value of this variable, as the variable ranges between the limits you derive from the table. (Hint: for 6 of them, NPV is linear in the variable, which means you can produce a graph with only two points, or with one point and a slope. Hand-drawn graphs are acceptable if they are neat and clearly labeled.)

4c) To which variable(s) does the decision about whether to pave the stockpile area have the most sensitivity? (Provide supporting evidence.)

4d) What is the NPV in the "worst-case scenario" in which all 7 of the variables take on the value least favorable to the paving project (within the limits derived from Table 15-2)?

4e) Overall, would you say the contractor should pave the stockpile area, or not pave it, or are you uncertain? If you are uncertain, what further information would you like to have so that you could become more certain? (There is not necessarily one right answer to this question.)