Name:

|  |  |  |
| --- | --- | --- |
| Problem | Points | Score |
| 1 (8.14) | 30 |  |
| 2 (10.18) | 35 |  |
| 3 (12.28) | 35 |  |
| Total | 100 |  |

Notes:

1. The exam is closed books and notes except for one double-sided sheet of notes. You are allowed the use of a calculator, interest tables or MS Excel on this exam.
2. Please indicate clearly your answer to the problem. Circle your answers.
3. The details of your solutions are more important than the answers. Please explain your solutions clearly and include as many details as possible.
   1. Consider the two one-shot investment alternatives shown in the table below. An investment has the following cash flow profile. Assume a MARR of 12%. What is the minimum value of X such that the investment is attractive based on an internal rate of return measure of merit?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **End of Year** | **0** | **1** | **2** | **3** | **4** |
| **Cash Flow** | -$30,000 | $6,000 | $13,500 | $X | $13,500 |

**10.18.** Raytheon wishes to use an automated environmental chamber in the manufacture of electronic components. The chamber is to be used for rigorous reliability testing and burn-in. It is installed for $1.4 million and will have a salvage value of $200,000 after 8 years. Its use will create an opportunity to increase sales by $650,000 per year and will have operating expenses of $250,000 per year. Corporate income taxes are 40 percent. Develop tables using a spreadsheet to determine the ATCF for each year and the after-tax PW, AW, IRR, and ERR if the chamber is kept for 8 years. After-tax MARR is 10 percent. Use straight-line depreciation (no half-year convention).

**12.28.** The winner of a lottery is given a choice of $1,000,000 cash today or $2,000,000 paid out as follows: $100,000 cash per year for 20 years with the first payment today and 19 subsequent annual payments thereafter. The inflation rate is expected to be constant at 4 percent/year over the award period, and the winner’s TVOM (real interest rate) is 3.5 percent/year. Which choice is better for the winner? Neglect the effect of taxes, life span, and uncertainty. Be sure to show your work and explain why… no credit will be given for guessing.