Assignment week 3 instructions.

EPM Assignment 3 - Complete Problems 5.1, 5.2 and 5.3 (sections a – e only) in page 169.

Please answer Problem 5.1, 5.2 and 5.3 parts a-e page 169 of the EPM Textbook. **Please make sure to use the ROI table format in chapter five, including your initial and final trials for the ROI values for each answer.**

For problem 5.1 Please use Present value (PV) calculations using P/A (n=5, 29, 40) to bring the yearly salary (A) back to the present (P). For the all three options that required that the student delay graduation until he/she receives the degree, you need to use P/A to account for years 1-5/1-29 and 1-40, then subtract the first one or two years of $70,000 of lost income salary opportunity that the student did not get while in school. Please summarize the results in a table with the baseline, and each of three options versus the years (5, 29, 40)

For problem 5.2, please use the ROI table format similar to the text; with depreciation, Taxes and after tax cash flow. Start with an initial ROI (2%), and then go to the next higher value (3%). You have to pro-rate the ROI % to get the correct answer.

For problem 5.3, you do not have to use the ROI table if there are no depreciation/Tax benefits. The ROI for all parts of the problem 5.3 will fall between 6 – 8 %. **Please pro-rate the ROI values**.

Guidelines for Mathematical Assignments:

Here is what I noticed after correcting previous years of homework, please use this feedback when you review and edit your mathematical homework, since most of you will be using Excel for computations:

1. Show the basic equation that you will use in answering the homework questions
2. Next, plug in the numbers that you will use to substitute for the variables
3. Then give the Excel table value if needed, copy and post it into the homework solution that you will be uploading with the homework.
4. In some cases I might ask you to arrange your answers in a prescribed table, so it is easy for me to locate your answers
5. I would encourage you to use commercial software or Internet resources to check your answers, but I need to see the equations that you are using and the value of the variables in these equations.

5.1. An engineering student will graduate this year with a BS degree at the age of 26. He expects to make $60,000/year for the rest of his career. He is considering his options for further study for an MS degree, where he can make an additional $10,000 per year. He is also thinking of retiring at the age of 55 or 66 years.

Option 1. Enroll in a master's degree program and pay full tuition at $40,000 and graduate in one year.
Option 2. Enroll in a master's degree program with a teaching assistantship, pay no tuition at all, and graduate in two years.
Option 3. Enroll in a master's degree program and pay full tuition at $40,000 and graduate in one year; borrow the money with a long-term student loan to be paid out in 10 years at $5000 per year starting at the end of the first year after he receives his MS degree.

Make a decision table based on present worth analysis (PW = PV). The table should include the baseline (no master's) and the three master's options. Assume an inflation rate of 5 percent. Make a snapshot of the four alternatives after five years and after a lifetime of work retiring at either 55 or 66 years. Assume no tax consequences. Please show all of your calculations in details. Put your results in a

5.2. A company is considering buying a plastic injection mold tool and has two options: a two-cavity mold at $45,000 or a four-cavity mold at $80,000. It is expected that each mold will last 100,000 shots and will have to be replaced at no book value. The company is expected to sell 40,000 parts/year at $0.25 profit per piece. Use ROI analysis techniques to determine which mold the company should buy, assuming a tax rate of 33 percent straight-line depreciation for the life of the machine. Do not include a replacement for the two-cavity machine after five years. Use hand calculations (no software) for ROI determination.

5.3. A company decided to develop low-cost photo-voltaic solar-energy cells. It decided on two development choices: a fully automatic line for $800,000 capable of producing 200,000 cells/year for a profit of $1/cell, or a semi-automatic line for $500,000 capable of producing 120,000 cells/year for a profit $1/cell. It is estimated that both lines will last for five years and will have a book value at the end of the five years of 10 percent. Assume both lines will be working to 100 percent capacity. You are the PM for development. Please make all calculations with or without taxes.

Show the ROI calculations for both machines, based on five-year life, 10 percent book value, and 33 percent taxes when applicable.

a. Fully automatic machine = assume 33% taxes, salvage value 10%, and five-year life
b. Fully automatic machine = assume no taxes, no salvage value, and five-year life
c. Semi-automatic machine = assume 33 percent taxes, salvage value 10%, and five-year life
d. Semi-automatic machine = assume no taxes, no salvage value, and five-year life
e. Conclusion: show which plan is better

   With taxes and remaining book value: fully or semi-automatic?

   Without taxes and remaining book value: fully or semi-automatic?

f. Show fixed and variable profit (including operating costs) breakeven point based on yearly volume for the first five years for both machines. Assuming i = 5%, 10 cents/cell cost to operate the automatic and 40 cents/cell to operate the semi-automatic machine. Selling price for both is $1/unit. Please make a plot of the breakeven sales point.
g. Assuming an interest rate of 5% and life of n = 5 years with no tax consequences or book value remaining, show probability analysis for PV for $500,000 semi-automatic @ 120,000 cells/year machine assuming two probabilities of profit per cell and useful number of years (n) for the machine. P (profit = $0.80) is 0.8 and P (profit = $1) is .20; and P ($n$ = 5) is 0.4 and P (n = 4) is 0.6
h. Assuming an interest rate of 5% and life of n = 5 years with no tax consequences or book value remaining, show sensitivity analysis for PV for semi-automatic machine @ 120,000 cells sold/year @ $1 profit per cell machine, assuming ± 20% variations in the profit per cell and useful life. Plot the PV results versus the profit and useful life ± 20% variations.