S-2.1 Redo Problems 5.28, 5.37, 6.21, 7.14 and 7.16 using Excel.

S-2.2 Redo Problem 6.21 assuming a study period of (a) 5 years and (b) 10 years. To clarify, what is required is to compare two policies in each of (a) and (b), to replace the loader every four years and every five years, while the study period is not over. At the end of the study period, the machine is salvaged. We have the following additional information. The loader salvage value after one year is $36,000, $32,000 after two years, and $27,500 after three years.

S2-3. (Apps) Income from the sale of apps is expected to be constant for several years and to then to decrease rapidly as the market gets close to saturation. In the following, “Year j” denotes the end of the year which is j years from now. The income from an iPhone app, developed by two senior AUB students, is expected to be $38,000 in Years 1 through 3, and then to decrease geometrically by 15% per year in Years 4 through 7 and by 20% per year in Years 8 through 12. The app is expected to generate no income after Year 12. You work for a big software company that is interested in buying the app from the two AUB students. Your company’s MARR is 15%. What is the price that would you recommend for the app?

S2-4. A wealthy businessman wants to start a permanent fund for supporting research directed toward data analytics. The donor plans to give equal amounts of money for each of the next 5 years, plus one now (i.e., six donations). The objective is that $100,000 be withdrawn in every even-numbered year, starting 5 years from now, (i.e., Years 6, 8, 10, …) and $50,000 in every odd-numbered year (i.e., Years 7, 9, 11, …), forever. If the fund earns 8% interest/year, how much must the businessman donate each year?

S2-5. (Machine) A machine acquired by your company has a useful life of five years. The maintenance and operations (M & O) cost of the machine is $1,000/month in the first year. In the next four years, the cost will increase by 10% per year (which kicks in the first month of each year). Your company MARR is 1% per month. What is the present worth of the machine's M&O costs?

S2-6. Antoon, an exuberant young engineer, is considering buying a new apartment similar to the one he is currently renting. He received an offer from his bank to finance the new apartment purchase. The bank will pay the apartment price of $45,500. In exchange, Antoon will pay the bank back in yearly installments for 20 years. He will pay $5,040/year for the first 10 years, and $2400/year for the following 10 years. His current rent is $2,520/year. He expects that rent will increase by 10% every 5 years for the next 20 years. Antoon’s MARR is 3% per year (this is the interest he can earn from a saving account).

a) What should Antoon do (buy or continue renting) to maximize his wealth over the next 20 years? Assume that the new apartment will loose 30% of its $45,500 market value after 20 years.

b) What would you do if you were in Antoon’s shoes? Elaborate on your answer with no more than few sentences.

S2-7. The Housing Bank (HB) offers home loans to Lebanese professionals. Borrowers receive the loan immediately upon buying a home, and pay back in equal monthly installments for 20 years. To encourage low-income applicants, a fixed interest rate of 6% compounded monthly is offered on loans not exceeding $120,000. A loan above $120,000 is subject to the 6% rate on the first $120,000, and the remainder part is subject to a higher interest of 8% compounded monthly. (E.g., for a $130,000 loan, the interest is 6% on the first $120,000 and 8% on the remainder $10,000). Furthermore, to help the borrower covering the many expenses associated with the purchase (e.g., taxes, fees, commissions, etc.), a 3-month “grace
"period" is offered. (That is, the first monthly payment is made at the end of the fourth month after receiving the loan.) However, interest at the rates above is applied to the loan during the grace period.

(a) Sa’eed, a successful EM graduate working for a growing consulting firm, applied for a $150,000 loan from HB to buy a small flat. How much is Sa’eed’s monthly payment?

(b) Sa’eed decided to go for a bigger home and now requires more money than in (a). However, HB has a stated policy that the monthly payment should not exceed one third of the borrower income. If Sa’eed’s salary is $3,600 per month, what is the maximum loan he can get from HB?

S2-8. The Lebanese Ministry of Transportation is considering three contracts to maintain the runways in Beirut airport. Details cash flows for the three alternatives (A, B and C) are shown below. Maintenance contracts A and B are expected to be renewed every time after they expire, at approximately the same costs and salvage values, over the foreseeable future.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
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<tbody>
<tr>
<td>Initial Cost</td>
<td>$100,000</td>
<td>$440,000</td>
<td>$400,000</td>
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<tr>
<td>Annual Cost per Year</td>
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<tr>
<td>Extra Repair Cost every 10 years</td>
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<tr>
<td>Extra costs every 2 years</td>
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<td>$0</td>
<td>$4,000</td>
</tr>
<tr>
<td>Salvage Value</td>
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<td>$30,000</td>
<td>$0</td>
</tr>
<tr>
<td>Life Cycle (in years)</td>
<td>4</td>
<td>20</td>
<td>∞</td>
</tr>
</tbody>
</table>

If the ministry must choose one of the above three alternatives, which alternative do you advise? The interest rate is 12% per year, compounded monthly?

S2-9. Rich-Folk Medical Center is considering acquiring a new medical imaging machine. The initial cost of this machine is $100,000. It will have an operating cost of $25,000 in Year 1, increasing by $5,000 per year. Income will be $70,000 in Year 1, decreasing by $4,000 each year. The machine will last six years. The cost for disposing of the machine at the end of its useful life is $2,000. What ROR will RFMC make from the machine? Solve by hand and by Excel.

S2-10. While browsing OLX, Sami saw an advertisement of a used car on sale for $7500, with a down payment of $500 and 60 equal monthly payments of $177.75 (computed based on running amortization). Sami thought that this is a good deal. However, he prefers to pay a down payment of $1,000 instead of $500. When asked, the dealer said she will be happy to change the payment plan, and will charge the same interest rate used in the advertised offer. What would be Sami’s monthly payment, with the $1,000 down payment?

S2-11. Rami is considering investing $20,000 in two Lebanese treasury bills. The first treasury bill is a 1-year, zero-coupon bond with a face value of $100, which is selling at 7.12% yield. The second is a 3-year, 5% coupon bond (paid annually) with a face value of $100, which is selling at a 9.32% yield. In order to diversify the interest rate risk, Rami decided to invest equal amounts of money in each bond.

(a) What are the prices of the two bonds?

(b) How many shares of each bond should Rami buy?
S2-12. The new Mitsubishi Lancer is being advertised in Al-Waseet for $12,900 with credit facilities up to 7 years and an interest rate of 3.75%. You are considering buying this car with the maximum credit facility period of 7 years from M Bank. To simplify the analysis, assume annual payment and compounding periods.

(a) Assume M Bank charges interest on the outstanding balance of the car loan. That is, the annual payment will be used to cover interest on the outstanding balance and part of the car price. What would your annual payment be?

(b) Assume now that M Bank adopts a form of installment payment, as discussed in one of the class videos. What would your annual payment be?

(c) What is approximately the actual interest rate you are charged under the installment payment scheme in (b)?