

S3-1. 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?

S3-2. 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?

S3-3. 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.



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

S3-4. In this problem, we are redefining roles. You are asked to take my place and write an exam question that test “students” on concepts from Chapters 1-4 that we covered so far. The rules for writing this problem are

- (i) Problem statement and questions should not exceed 12 lines (Font 12).
- (ii) It should be solvable within 30 minutes of exam time with a hand calculator. You should provide the solution for the problem that demonstrates this.
- (iii) It has to be your own writing (no Googling or copying from textbooks). We will check using turn-it-in and other tools.
- (iv) You need to write 2-3 lines explaining how you come with this problem, mainly whether it relates to a personal experience for you or someone you know. (Write these after the problem statement, please.)
- (v) You need to write 2-3 lines explaining what would someone learn from solving this problem. (Write these after the problem statement, please.)

In grading this problem, you will get

- (a) 0 out of 40 points if you violate any of Rules (i)-(v). (This problem is worth 40% of the HW 3 grade.)
- (b) 30 out of 40 points if you just followed the rules and wrote a nice exam problem.
- (c)  $(30 + IT)$  out of 40 points if you followed the rules and wrote a problem with an “Index of toughness”  $IT$ , where  $IT \in [0, 10]$ . That is, the tougher your problem is, while following Rules (i)-(v), the more points you get. To give you an idea about  $IT$ , the three above problems (which were given on previous exams) have the following  $IT$ s,

Problem	IT
S3-1	10
S3-2	7
S3-3	8