

IE375 Fall 2020 Homework I - Due: October 2, Friday, 17:00

Information on Homework I

- **Homework I is 2%. Make sure that you review course material before you start. Cite sources used if any.**
- **Grading Policy:** The homework grades will not be only based on the correctness of the answers provided, but on the perceived degree of effort on the returned assignment. This means that even without obtaining the correct answers one can obtain full credit. The grade scale will be “2” (full effort, all questions); “1” (some effort or full effort, some questions); “0” (no effort or no submission). The submissions that exceed expectations may get a bonus – grade will be “3” (extra effort). Note that “2” corresponds to a grade out of 100% - 2% of the overall grade in this case. Late submissions will not be accepted.
- The grading scale for each question is 2 points (full effort), 1 point (some effort), and 0 (no effort or no submission). Total points that would lead to your overall HW grade are given below:

Total Points	HW Grade
6 or 6+	3
3-5	2
1-2	1
0	0

- **Academic Dishonesty (taken from IE375 Course Information):** Academic misconduct is not tolerated, and violations will be treated in accordance with the University policy. For assignments: Discussion of the course material and working in groups are effective ways of learning. However, this does not mean that you are allowed to copy the assignment from one of your friends. You can discuss with your friends, but you should be alone, without any written solution in front of you, when you actually prepare your assignment. It is extremely important to understand the value of this exercise in the process of learning. Any violation of the above understanding will result measures outlined in the student rules and regulations.
- **Submission Information:** Please send your solution as a pdf file to IE375 Course TA Egemen Elver. Make sure that pdf contains your name and you mail it from your mail account available in STARS. Also note that if your mail is different than the one provided by Bilkent University, there is a chance that it will be received after the due-time.
- **Information on Questions: What is expected? How to study?**

Homework 1 is mostly a reading assignment and three computational questions, which follow parts of the reading.

Question 1 and Question 2 of the Homework contains two questions related to the material in Chapter 1 that I have partially (actually very selective) covered in class – you are expected to read Chapter 1 of your text-book and answer these questions. Both problems are related to strategic decisions. The key is to learn standard methods and understand how they are applied. Question 3 is on the introductory material for forecasting (as covered in class). All methods can be applied to a given data set, but it is important you realize why and how a method is selected for a given data set. Note that, once routine (technical) parts are learned, you can always “automate” the procedures. Hence, for computations you can use excel (or a similar spreadsheet program). However, you have to clearly show how you have performed your computations and proof of evidence of the spreadsheet (hence the spreadsheet you submit should contain understandable definitions of what you are doing in each column and/or row). In the exams, you will be given all the formulas you will need. However, you have to make sure that you know which one to select, and how to use it. Moreover, you will not be allowed to use “spreadsheets” during the exam, and hence you have to make sure that you can perform the arithmetical operations systematically in a relatively short time. Homework and exercises are useful for that purpose, as well.

One final remark: In the exams, please get used to receiving question types that you have not seen before. One useful purpose of homework and exercises is to cover the “routine” so that you can go beyond that during the exams, and elsewhere.

PLEASE READ QUESTIONS CAREFULLY. FOR THE QUESTIONS FROM THE TEXT-BOOK THERE MIGHT BE CHANGES IN THE GIVEN VALUES PRESENTED BEFORE THE PROBLEM STATEMENT.

- 1) Questions 38 and 39, Section 1.11, p. 46 for 7th Edition (Question 35 and 36, Section 1.11, p. 46 for 6th Edition) (not covered in class; read the material from the text to answer).

*****UNIT COST IS \$26 TO PRODUCE*****

35. A start-up company, Macrotech, plans to produce a device to translate Morse code to a written message on a home computer and to send written messages in Morse code over the airwaves. The device is primarily of interest to ham radio enthusiasts. The president, Ron Lodel, estimates that it would require a \$30,000 initial investment. Each unit costs him \$20 to produce and each sells for \$85.
- How many units must be sold in order for the firm to recover its initial investment?
 - What is the total revenue at the break-even volume?
 - If the price were increased to \$100 each, find the break-even volume.
36. For Problem 35, suppose that sales are expected to be 100 units in the first year and increase at a rate of 40 percent per year. How many years will it take to recoup the \$30,000 initial investment? Assume that each unit sells for \$85.

- 2) Question 42, p. 47, Section 1.11, for 7th Edition (Question 44, Section 1.11 for Chapter 1, p. 47 for 6th Edition).

42. A major oil company is considering the optimal timing for the construction of new refineries. From past experience, each doubling of the size of a refinery at a single location results in an increase in the construction costs of about 68 percent. Furthermore, a plant size of 10,000 barrels per day costs \$6 million. Assume that the demand for the oil is increasing at a constant rate of two million barrels yearly and the discount rate for future costs is 15 percent.
- Find the values of k and a assuming a relationship of the form $f(y) = ky^a$. Assume that y is in units of barrels per day.
 - Determine the optimal timing of plant additions and the optimal size of each plant.
 - Suppose that the largest single refinery that can be built with current technology is 15,000 barrels per day. Determine the optimal timing of plant additions and the optimal size of each plant in this case. (Assume 365 days per year for your calculations.)

3) Question 13, Section 2.6, p. 66 - Question from Chapter 2 for 7th Edition (Question 13, Section 2.6, p. 64 - Question from Chapter 2 for 6th Edition).

Two forecasting methods have been used to evaluate the same economic time series.
The results are

Forecast from Method 1	Forecast from Method 2	Realized Value of the Series
223	210	256
289	320	340
430	390	375
134	112	110
190	150	225
550	490	525

Compare the effectiveness of these methods by computing the MSE, the MAD, and the MAPE. Do each of the measures of forecasting accuracy indicate that the same forecasting technique is best? If not, why?