

IE375 Spring 2000 Mini Homework I - Due: April 2, 2020 Due-time: 17:00

- **Mini Homework I is 2%. Make sure that you review course material before you start. Cite sources used if any.**
- **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 can 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 Emin Özyoruk.
- **More Information on Question: What is expected? How to study?**
- To answer the question, make sure that you understand the material presented during the course, as well as the reading material from the textbook.
- Make sure that you understand the problem, and only present your answer accordingly.
- **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.

Question

Consider an auto manufacturer that assembles cars in Turkey with a constant rate of 20 cars per day. The car assembly requires engines that are sourced from Japan. Each engine costs the manufacturer 1300 TL and inventory holding costs are 20% of the cost per engine per year. Engines are shipped from Japan over the ocean in one container with a fixed cost of 12000 TL per container. The lead time is 20 days. Assume that the manufacturer works 365 days in a year.

- a) Assuming that the container has infinite capacity. How many engines should the car manufacturer order each time? You do not need to have an integer value for the order quantity.
- b) What is the resulting optimal annual holding and setup cost?
- c) What is the time between consecutive orders (cycle length)?
- d) What is the re-order point?
- e) Assume that we are in day 0 and the car manufacturer has 1200 engines in inventory. There are no outstanding orders. When is the first time the manufacturer should place an order to its engine supplier in Japan?
- f) Engines can be shipped from Japan using one standard container (not more than one) and the container has a limited capacity. Assume now that the container can carry at most 75% of the order quantity you found in **Part a**.
 - i. What is the new order quantity the manufacturer would choose?
 - ii. What is the additional annual cost the manufacturer would pay compared to your result in **Part b**?