

IE375 Spring 2020 Mini Homework IV- Due: April 30 2020 Due-time: 17:00

- **Mini Homework II is 2%.** The first question weighs 60% and the second 40%. 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 questions, make sure that you understand the material presented during the course, as well as the reading material from the textbook. Question 1 is related to standard R,Q, policies for continuous review inventory systems. It also prepares you for the solution of Case 2. Question 2 is related to multi-item systems and asks you to carry out different ABC analyses and interpret their possible usage.
- Make sure that you understand the problems, 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 1 (Part of the below is an exam question from previous years)

The inventory of a purchased item is controlled with a continuous review (Q, R) policy. The item demand over two-weeks of lead time follows a uniform distribution with a mean of 500 units in the interval of (200, 800). Fixed cost of ordering is \$300, and the unit carrying cost per week is \$0.16. Shortages are backordered at a cost of \$12 per unit. Assume 50 weeks per year. Hint: Make sure that the quantities you use have comparable units in the formulas you apply.

- a) If the optimal order quantity is given as 2500 units, find the optimal reorder level.
- b) Find the fill rate value given order quantity of size 2500 and the reorder level found in part a). (Fill rate is the proportion of total demand satisfied directly from the shelf.)
- c) Find terms for $n(R)$ and $F(R)$ for any R using the uniform distribution given.
- d) Use c) to find the optimal Q and R values. Note that it is easier to apply the algorithm.
- e) What is the reorder point if the demand over lead-time was incorrectly assumed to be constant at 500, and a deterministic EOQ problem with no backorders was solved? Find the fill-rate for this reorder level assuming that the correct lead-time demand distribution was a uniform distribution with a mean of 500 units in the interval of (200, 800).

Question 2 (A question from the text-book with additional parts)

Consider the following list of retail items sold in a small neighborhood gift shop.

Item	Annual Sales Volume (units)	Average Cost per unit (\$)	Average Contribution to Profit /unit (\$)	Supplier
Greeting Cards	3870	1.50	0.40	S1
T-shirts	1550	10.50	1.25	S2
Men's jewelry	875	15.00	4.50	S3
Novelty gifts	2050	22.50	12.25	S1
Children's clothes	575	20.00	6.85	S2
Chocolate cookies	7000	0.25	0.10	S4
Earrings	1285	10.00	3.50	S3
Other costume jewelry	1900	25.00	15.00	S3

- Rank the item categories in decreasing order of the annual contribution to profit. Classify each item into categories A and B.
- Rank the item categories in decreasing order of the annual variable. Classify each item into categories C and D.
- Rank the suppliers in decreasing order of their associated annual costs. Classify suppliers into categories E and F.
- Try to come up with possible uses of each ranking and classification you have performed in parts a, b, and c?
- Try to come up with possible collective uses of groups A thru F for inventory systems.
- Why do think a very low profit margin item, chocolate cookies, is sold in the retailer?