IE375 Spring 2020 Mini Homework III- Due: April 16 2020 Due-time: 17:00

- **Mini Homework III is 2%.** The first question weighs 30% and the second 70%. 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 EOQ, Rotation Cycle policy and analysis of different cost assumptions to select the best. Question two requires you to derive an objective function (similar to EOQ, you need to write areas, etc. for the backorder case mentioned in the lecture on Tuesday April 7) and comparison of two functions algebraically.
- 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

Billy's Bakery bakes fresh bagels each morning. The daily demand for bagels is a random variable with a distribution estimated from prior experience given by

Number of Bagels Sold in One Day	Probability
0	.05
5	.10
10	.10
15	.20
20	.25
25	.15
30	.10
35	.05

The bagels cost Billy's 8 cents to make, and they are sold for 35 cents each. Bagels unsold at the end of the day are purchased by a nearby charity soup kitchen for 3 cents each.

a) Based on the given discrete distribution, how many bagels should Billy's bake at the start of each day? (Your answer should be a multiple of 5.)

b) Approximate the discrete distribution with a normal distribution. To initiate the approximation, you need to compute the mean μ and the variance σ^2 of the demand from the given discrete distribution. Determine the optimal number of bagels to bake each day using the normal approximation. Why do think the results are different?

Question 2 (An exam question from previous years)

A sports club prepares for the celebration of a possible 20th championship of its football team in the junior league. The team has a large number of supporters, and the management thinks that they should be well-prepared for the possibility and plan the number of high-end sweat-shirts to procure from Italy. The unit cost of the shirt to the club is 68 TL, and it will sell for 260 TL. Any sweat-shirt not sold by the end of the short celebration period is purchased by regular stores to 40 TL/piece.

As a result of a number of detailed analyses the demand for sweat-shirts in case of a championship will have a normal distribution with a mean 1500 (thousand) and a standard deviation of 300 (thousand) units.

a) Determine c_u (cost of underage) and c_o (cost of overage) values for the above problem.

b) What is the ordering quantity (in thousands of shirts) of the retailer to minimize its expected total cost? (You can use the normal table supplied or excel computations – make sure you describe what you are doing.)

c) Given that the ordering quantity is Q*, what is the expected number of sweat-shirts not sold? Write the expression in terms of Q* and compute. (You can use the normal table supplied or excel computations – make sure you describe what you are doing.)

d) Given that the ordering quantity is Q*, what is the expected excess demand for sweat-shirts? Write the expression in terms of Q* and compute. (You can use the normal table supplied or excel computations – make sure you describe what you are doing.)

Normal Distribution Table (your text book has the complete table in the Appendix at the back)

F(z) – cdf of standard normal

L(z) – standard normal loss function to

Use interpolation if needed using 4 digits after the decimal points.

Standardized Value (z)	*F(z)*	*L(z)*	Standardized Value (z)	*F(z)*	*L(z)*	Standardized Value (z)	*F(z)*	*L(z)*
-3.00	0.0014	3.0004	-0.35	0.3632	0.5981	0.65	0.7422	0.1554
-2.00	0.0228	2.0085	-0.05	0.4800	0.4244	0.70	0.7580	0.1429
-1.00	0.1587	1.0833	0.00	0.5000	0.3989	0.75	0.7733	0.1312
-0.95	0.1712	1.0416	0.05	0.5200	0.3744	0.80	0.7881	0.1202
-0.90	0.1841	1.0004	0.10	0.5398	0.3509	0.90	0.8159	0.1004
-0.85	0.1977	0.9600	0.15	0.5596	0.3284	1.00	0.8413	0.0833
-0.80	0.2119	0.9202	0.20	0.5793	0.3069	1.10	0.8643	0.0686
-0.75	0.2266	0.8812	0.25	0.5987	0.2863	1.20	0.8849	0.0561
-0.70	0.2420	0.8429	0.30	0.6179	0.2668	1.40	0.9192	0.0367
-0.65	0.2578	0.8054	0.35	0.6368	0.2481	1.60	0.9460	0.0232
-0.60	0.2743	0.7687	0.40	0.6554	0.2304	1.80	0.9641	0.0143
-0.55	0.2912	0.7328	0.45	0.6736	0.2137	2.00	0.9772	0.0085
-0.50	0.3085	0.6978	0.50	0.6915	0.1978	2.20	0.9861	0.0049
-0.45	0.3264	0.6637	0.55	0.7088	0.1828	2.40	0.9918	0.0027
-0.40	0.3446	0.6304	0.60	0.7257	0.1687	3.00	0.9986	0.0004