IE375 –Spring 2024
Comments on Exam II

General Comments:

This exam is reasonably standard and aims to evaluate your related knowledge and your performance on the basics of the current course. This exam required you to analyze numbers, as well as to approach some cases conceptually. Engineers work on data, so you must accumulate experience to understand, interpret, and utilize the "numbers" obtained.

The first question is on forecasting, which brings most of what you have covered in class. Questions 2 and 3 are on inventory planning.

This exam is a balanced one with questions:

1. Requiring you to apply known methodologies (Question 1, Question 3, Part a) through c).
2. To model or interpret a given environment (Question 1, Question 2, Question 3, Part d).

Thank you all for signing the honor code. Also, most of you have improved his/her skills on reading the exam question carefully and responding accordingly. Thank you.

Please find some statistics on your exam results below. There is at least one full correct answer for each part of all questions, showing that the questions are doable.

Exam Results:

Mean: 48.4
Std. Dev.: 20.8
Max: 95
Min: 4

Frequency Distribution:

Range	**0-10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-60**	**61-70**	**71-80**	**81-90**	**91-100**
Freq.	2	2	6	19	7	7	5	9	4	1

The frequency distribution of grades you have received for each of the questions are given below. Note that the mode of the exam is in the range 31-40, the interval that the average is in 41-50, showing that it is not necessarily a balanced exam. The value of the standard deviation is high compared to the mean, all showing the fact that there were pretty low grades.

Finally, if you received a grade which is below 40, I think you need to feel the pressure. Of course, for those of you who have received above 40 but below 70, you need to be careful.

Question 1

This is a rather standard forecasting question. The text book contains a similar question (may be even the same one), as well.

A few hints on grading:

- Some of you showed a reasoning which I took as an indication of understanding the material, although there was no correct answer. At most 8 points were granted in those situations.
- Some of you did some work, but used an incorrect (and hence were not able to do much!) model or a combination of models. At most 5 points were granted in those situations. (Compare this with the previous dot – this is how I value reasoning – more than I value a lot of inconsistent solutions.
- If the final relation was missing, I granted at most 15 points.

- Three points were taken off if the coefficients in the final term were incorrect and all others are correct.
- Three points were taken off if the forecasting term used is incorrect and all others are correct.

The frequency distribution of grades you have received for the question are given below:

Range	**0-5**	**6-9**	**10-13**	**14-17**	**18-20**
Freq.	29	4	5	9	15

Other statistics on the results of this question are:

Mean: (out of 20) 9.1
Std. Deviation: 8.2
Max: 20
Min: 0

Now, probably you can analyze the above information, as well. The mode is in 0-5 range showing some of you (29 students) did not attempt of made unsuccessful attempts to solve the question. It is interesting, because you were relatively successful in the forecasting questions in exam 1. It may be an indication of memorizing topics – not meaningful for this level of education.

Question 2

This was supposed to be a simple question, supposedly taking less time than the total value (approximately 30 minutes). It turned out to be a nightmare for most of you.

Part a) Youwere expected to write the two formulas for the rortation cycle policy, both among the formulas given (T_{min} formula was incorrect – nevertheless it idd not affect the solutions as I did not require to make any conputations).

Part b) What the asked should be carefully read: **Given a T**, means that you have any T value given to you. Note that T is defined in th equestion statement. The answer is very simple: $T^*\lambda_j = Q_j$. A lot of mistakes were made, including using the production rate instead of the demand rate.

Part c) Now I ask you to determine if a given T is feasible or not. AT this point, there are two di,fferent feasibilities:

- The problem parameters should be such that the production and demand rates should not create any infeasibility for trhe problem – summation $\sum_j \lambda_j / P_j < 1$ (if this condiditon is not met, demand can not be satisfied). I assumed that you have this form the setup – no points were taken off.
- The more important one is the minimum time you can allow, as setyup times are present in the system. It is identified by T_{min}. So $T \geq T_{min}$. If you are not sure, another way of writing this would be: $T \geq T \sum_j \lambda_j / P_j + \sum_j s_j$. This response will bring 5 points.
- Now, wth the alternative way of writing, the machine will be idle $T - \{ T \sum_j \lambda_j / P_j + \sum_j s_j\}$ units of time every cycle. You can also include the setup time to the idle time – no problem. This response will bring 5 points.

Part d) This is a special case of th emain problem. As the production rates go to infinity $T_{min} = \sum_j s_j$ (same with the incorrect formula). So feasibility means – $T \geq T_{min}$. T* will be of the same strucvture like Part a) but now has a simpler form). Fo part d) infeasibility issue was worth 5 points and optimality was worth another 5 points. For most of the mistakes, I granted at most 2 points as the partial grade.

Statistics on the results of this question are:

Mean: (out of 30): 11.9

Standard Deviation: 7.2
Max: 30
Min: 0

Frequency distribution:

Range	**0-6**	**7-12**	**13-18**	**19-24**	**25-30**
Freq.	16	19	14	9	4

Not much to say. Once you read the comments, you probably would realize that you could have solved this question. If the grade you received is 18 or below, I suggest you to start reviewing the material.

Question 3

This is a standard question, which tested your knowledge of the continuous review problem, including the service level concepts. I am generally happy with the results for this question, especially after the first two questions.

Part a) I) Simply asked you to compute the fill rate for given Q and R values.

Part a) II) Simply asked you to compute the imputed (implied) backorder cost terms for given Q and R values. If you just wrote the correct formula, you received 4 points (unless you had another entry which was not consistent).

Part b) Asked you to implemented the algorithm.

Part c) Asked you to compute a new mean and standard deviation of the lead time demand, when lead time changed from 4 to 5 weeks.

Part d) Asked for interpreting a negative F(R) value. The correct answer is: If the RHS of the condition turns out to be negative, it means that the assumption we made to compute the average inventory (backorder cost is much greater than the holding cost, hence we expect to see few backorders as it is more expensive) does not hold. Only one student had the correct answer.

Common mistakes: Most of you do not know the details of the normal distribution and hence you lost a lot of grades while computing terms. Please make sure that you can make those computations effectively for the final exam.

The frequency distribution of grades you have received for the question is given below:

Range	**0-10**	**11-20**	**21-30**	**31-40**	**41-50**
Freq.	9	11	16	10	6

This is the type of frequency distribution and grades (increasing and then decreasing with the mode and the average being in the same range + balanced) I want to see for the exam and for each of the questions. If the grade you received is 20 or below, I suggest you to start reviewing the material.

Other statistics on the results of this question are:
Mean: (out of 50) 27.4
Standard Deviation: 13.3
Max: 47
Min: 0