General Information Final Online Exercise: Read this. Questions are further below.

The online exercise will take place during exam period time. The number of questions and difficulty will vary. The online exercise is open book and open notes only. The online exercise is an individual activity. Communication with others during the exercise is misconduct. The exam regulations as well as the academic conduct regulations apply to all submitted work. The questions will be posted in the assignment drop box in Moodle. You are to work on the problem and submit to the course website in the CORRECT drop box. You are responsible for submitting complete work and only what is submitted will be evaluated by the grader.

You must submit the handwritten work in a clear and readable format, if you are writing the answers by hand, you must ensure that the work is legible and that your answers are clearly indicated. Typically, pdf files are good for submission as they are not OS or platform dependent. If you are taking pictures of your submission, make sure that all the images are clear, and it is best to submit all your images in a single file. If you submit more than one solution, the last one submitted will be the only one graded.

The online exercise will be issued in an assignment box few minutes before the official start time of the online exercise.

Students who submit within (90 minutes) will receive no penalty. *Note that the allotted time includes submission time*. You should take submission time into account when solving the problem.

Students who submit after 90 minutes but before 135 minutes will receive a penalty. Note the time is rounded to *minutes* for this analysis.

Where X = submission time after exercise start as recorded on the drop box in MOODLE.

0 < X <= 90 Minutes. Penalty none.

90 < X <= 105 minutes. Penalty-10% of total grade

105 < X <= 120 minutes. Penalty-20% of total grade

120< X <= 135 minutes. Penalty -30% of total grade

X > 135 minutes submission not accepted ZERO.

ACSD students will be able to use their normal additional time (45 additional minutes) without late penalty. The assignment drop box remain open officially 135 minutes, after which submission is not accepted.

It is the student's responsibility to make sure that their submission is complete and submitted on time.

Attempt all problems, clearly indicate which problem you are solving. Show all your work (written by hand) and clearly indicate your final answer, the answer without the work is not sufficient. Make sure that your name and ID are clearly indicated on your submission. If you make a *reasonable* assumption, clearly indicate the assumption and how if affects your answer. I will not be answering questions during the online exercise to insure consistency. I will see about posting solutions after the online exercise is graded. Communication with others during the 135 minutes which the exercise takes place is misconduct. The work submitted must be your own original work. Accessing other people's work, websites, or publications beyond the lecture notes and textbook is misconduct. I will report suspected misconduct to the dean's office.

Final Online: May 4, 2021

In this set of exercises some constants will be obtained from your ID number. If your ID number ended with the digits "371" then the last digit would be "1", the second to last digit would be "7".

Attempt All three questions. *Show all your work and clearly indicate the final answer. The answer without the work is not worth full marks*

Test Question 1) (10 Marks)

A heavily used network has a chance "p" of losing a data packet that must be resent. Packet losses are independent events. An email package requires 100 packets. For this problem p=(0.005+A/200) where "A" is the last digit of your ID number. *Show all your work and clearly indicate the final answer. The answer without the work is not worth full marks.*

a) What is the distribution of packets in an email that must be resent? (2.5 Marks)
b) What is the probability that at least one packet is resent? (2.5 Marks)
c) Find the mean and standard deviation of resent packages. (2.5 Marks)
d) If there are 10 messages, each containing 100 packets, what is the probability that at least one messages requires that one or more packets be resent? (2.5 marks)

Test Question 2) (10 Marks)

Given the joint probability distribution $f_{xy}(x,y) = \begin{Bmatrix} ke^{-2x}e^{-3y} & 0 < x < (2+A), 0 < y < x \\ 0 & elsewhere \end{Bmatrix}$. Where "x" and "y" are continuous random variables and "A" is the last digit of your ID number. *Show all your work and clearly indicate the final answer. The answer without the work is not worth full marks.*

a) Compute the value of the constant "k" provide a numerical value. (4 Marks)
b) Obtain the marginal probability density function $f_x(x)$. Include numerical values for all constants. (2 Marks)
c) Compute the conditional probability $P(Y > \frac{1+A}{4} | X = \frac{1+A}{2})$. Provide a numerical value for the probability. (4 Marks)

Test Question 3) (10 Marks)

A random sample has been taken from normally distributed population that has a standard deviation of $\sigma = (6 + \frac{A}{10})$, where "A" is the last digit of your ID number. The following information was obtained, $\sum x_i = (750 + A - B)$ and $standard\ error\ of\ the\ mean = (1.5 + \frac{A}{100})$, where "A" is the last digit of your ID number and "B" is the second to last digit of your ID number. *Show all your work and clearly indicate the final answer. The answer without the work is not worth full marks.*

a) Compute the number of samples "N" that were obtained and the sample mean "$\bar{X}$". (2.5 Marks)
b) Compute a 95% two-sided confidence interval (CI) on the population mean. (2.5 Marks)
c) Compute a 95% two-sided prediction interval on the next observation. (2.5 Marks)
d) Suppose that we wanted the error in estimating the population mean from the two-sided confidence interval to be 2 at 95% confidence. What sample size should be used? (2.5 Marks)