

EECS 461 Probability and Statistics

Fall Semester 2022

Assignment #7 Due **13 October 2022** Note that this is a Thursday since it is still Fall Break on Tuesday.

Reading: Sections 4.5 - 4.8, 5.1 - 5.2 in Yates/Goodman

Do all of the Quizzes in the Reading assignment but do *not* hand them in. Answers to the Quizzes are on the book's website (search Yates Goodman Wiley)

For all problems from the book, you should use the method(s) from the corresponding section to solve the problem.

1. Problem 4.5.6, p. 156.
2. Find each of the following probabilities for a Gaussian random variable. Show all work and give numerical values. These are good "rules of thumb" to remember for Gaussian random variables.
 - a. The probability that the RV is within one standard deviation (either way) from the mean.
 - b. The probability that the RV is within two standard deviations (either way) from the mean.
 - c. The probability that the RV is within three standard deviations (either way) from the mean.
3. Problem 4.6.4, parts (a) and (b) only, p. 158.
4. The lifetime of a computer circuit board can be modeled as a Gaussian random variable with a mean of 2500 hours. If 95% of the boards are to last at least 2400 hours, what is the largest variance that the random variable can have?
5. A manufacturer of precision resistors produces resistors whose values follow a Gaussian distribution with a mean of 500 Ohms and a variance of 2 Ohms. In advertising literature, the manufacturer wants to claim "The probability of one of our resistors having a value outside the range from $500-X$ Ohms to $500+X$ Ohms is 1 in a million." What should she use for the value of X ?
6. For a 1-hour midterm exam, 80% of the students finish the exam and hand it in by the end of the hour, and 20% have to turn them in at the end of the hour without finishing the exam. For the students who finish by the end of the hour, their turn-in times are uniformly distributed between 45 and 60 minutes. Let T be the random variable of the turn-in times of the students, in minutes.
 - a. Find the PDF of T .
 - b. Find the CDF of T .
 - c. Find the expected value of T .
7. Problem 4.7.6, p. 160.