

EECS 461 Probability and Statistics
Fall Semester 2022
Assignment #4 Due 20 September 2022

Reading: Sections 2.4, 3.1-3 - 3.4 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. A process has 5 components connected as follows. Component 1 is followed (series) by components 2, 3, and 4 connected in parallel, followed by (series) component 5. Component 1 has reliability 0.99; components 2, 3, and 4 have reliabilities of 0.96, 0.92, and 0.85 (respectively); and component 5 has reliability of 0.95. What is the overall reliability of this process?
2. Problem 2.4.2, p. 61.
3. Some drivers from Lawrence to KC stop in KC and others continue to another destination. We know that, on average, 5% of the drivers arriving in KC from Lawrence continue to St. Louis. If we stop drivers arriving in KC from Lawrence and ask what their destination is, what is the probability that we will have to stop exactly 30 drivers before finding one who is traveling to St. Louis? Identify the family of PMF that you used.
4. Widgets coming off a production line are sampled and tested randomly in batches of 3 items, with each item being declared either defective or working. From prior experience, it is known that, on average, 10 of every 100 widgets will be defective. If A is the random variable that is the number of defective widgets in a batch, develop the Probability Mass Function (PMF) of A , identify which family it belongs to, and graph it.
5. A box contains 3 blue balls and 1 red ball. The experiment is as follows. Balls are picked in succession until the red ball is picked. Any time a blue ball is picked, it is discarded and another ball is picked from the box. Let R be the RV of the number of picks to get the red ball. Develop the PMF of R , identify which family it belongs to, and graph it.
6. Telephone calls arrive at a call center at an average rate of 300 calls per hour. What is the probability that no more than 2 calls will arrive during any given minute? State any assumptions that you used.
7. Problem 3.3.16, p. 109.
8. A discrete RV B has PMF $P_B(b) = C/b$ for $b = 1, 2, 3, 4, 5$ and 0 otherwise, for some constant C .
 - a. Find the value of C .
 - b. Sketch the PMF of B .
 - c. Find and sketch the Cumulative Distribution Function (CDF) of B