



Homework 2

Statistical Inference, Spring 97



- 1- Collecting data on traffic accident fatalities, the National Highway Traffic Safety Administration has found that 47.1% of the victims have 0.0% blood alcohol content (BAC), 7.0% of the victims have from 0.01 to 0.07% BAC, and 45.9% of the victims have at least 0.08% BAC. For a randomly selected victim:
 - a. What is the probability that the victim's BAC was at least 0.01%?
 - b. Given that the victim had been drinking prior to the accident, what is the probability that this victim's BAC was at least 0.08%?
- 2- In examining borrower characteristics versus loan delinquency, a bank has collected the following information: (1) 15% of the borrowers who have been employed at their present job for less than 3 years are behind in their payments, (2) 5% of the borrowers who have been employed at their present job for at least 3 years are behind in their payments, and (3) 80% of the borrowers have been employed at their present job for at least 3 years. Given this information:
 - a. What is the probability that a randomly selected loan account will be for a person in the same job for at least 3 years who is behind in making payments?
 - b. What is the probability that a randomly selected loan account will be for a person in the same job for less than 3 years or who is behind in making payments?
 - c. If a loan account is behind, what is the probability that the loan is for a person who has been in the same job for less than 3 years?
- 3- A trucking company has found that its trucks average 0.2 breakdowns during round trips from New York to Los Angeles.
 - a. What is the probability that a single truck will make the complete trip without experiencing a breakdown?
 - b. If 3 trucks are assigned to a NY/LA round trip, what is the probability that at least 2 of them will make the complete trip without experiencing a breakdown?
- 4- J. D. Power and Associates' Initial Quality Study reports that the industry-average problem rate for vehicles is 154 problems per 100 vehicles. The highest-rated marque was Acura, with a rate of just 91 problems per 100 vehicles. On the other hand, Kia was reported as having 251 problems per 100 vehicles. Allen is on his way to pick up his brand-new Acura. At the same time, Kevin is on his way to pick up his brand-new Kia.
 - a. What is the probability that Allen's Acura will have exactly 2 problems?
 - b. What is the probability that Kevin's Kia will have no more than 1 problem?
 - c. What is the probability that neither Allen nor Kevin will have a problem with his car?
- 5- The U-Drive car rental corporation has found that the cars in the company's rental fleet experience punctures at the rate of 1.25 punctures per 10,000 miles, and the number of punctures per distance traveled is Poisson distributed. Ed and Harriet are taking advantage of a U-Drive promotion in which there is no mileage charge. During their vacation, they plan to drive from Boston to Los Angeles and back, a total distance of 6164 miles.



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- a. What is the probability that Ed and Harriet will not have to change any tires during their vacation?
 - b. While traveling west, what is the probability that Ed and Harriet will experience a punctured tire before they make it to Denver, 2016 miles away?
- 6- During an annual heating season, the average gas bill for customers in a New England community heating their homes with gas was \$457. Assuming a normal distribution and a standard deviation of \$80:
- a. What proportion of homes heating with gas had a gas bill over \$382?
 - b. What proportion of homes heating with gas had a gas bill between \$497 and \$537?
 - c. What amount was exceeded by only 2.5% of the homes heating with gas?
 - d. What amount was exceeded by 95% of the homes heating with gas?