

Seminar 14

1. An inspector on the ABC Pipeline has the task of comparing the reliability of two pumping stations. Each station is susceptible to 2 kinds of failure: pump failure and leakage. When either (or both) occurs, the station must be shut down. The data at hand indicate that the following probabilities prevail:

Station	P(Pump Failure)	P(Leakage)	P(Both)
1	0.07	0.1	0
2	0.09	0.12	0.06

- Which station has the higher probability of being shut down?
2. The ABC Corporation wishes to improve the resistance of its personal computer to disk drive and keyboard failures. At present, the design of the computer is such that disk-drive failures occur only one-third as often as keyboard failures. The probability of simultaneous disk drive and keyboard failure is 0.01.
- If the computer is 90 percent resistant to disk drive and/or keyboard failure, how low must the disk-drive failure probability be?
 - If the keyboard is improved so that it fails only twice as often as the disk-drive (and the simultaneous failure probability is still 0.01), will the disk-drive failure probability from part (a) yield a resistance to disk-drive and/or keyboard failure higher or lower than 90 percent?
3. A company assembles 10 computer chips to make an electronic pager unit,
- there is 95% of component chips are good, what is the chance that the pager will work if all 10 chips must work for the pager to work?
 - there is 95% of component chips are good, what is the chance that the pager will work if at least 9 chips must work for the pager to work?
4. Two cards are selected from a deck with replacement, what is the probability the second card is
- a face card, given that the first card was red?
 - an ace, given that the first card was a face card?
 - a black jack, given that the first card was a red ace?
5. The health department routinely conducts two independent inspections of each restaurant, with the restaurant passing only if both inspectors pass it. Inspector A is very experienced, and, hence, passes only 2 percent of restaurants that actually do have health code violations. Inspector B is less experienced and passes 7 percent of restaurants with violation. What is the probability that:
- inspector A passes a restaurant with violation, given that inspector B has found a violation?
 - inspector B passes a restaurant with violation, given that inspector A passes it?
 - The health department passes a restaurant with violation?

Seminar 14 (cont.)

6. At a soup kitchen, a social worker gathers the following data. Of those visiting the kitchen, 59 percent are men, 32 percent are alcoholics, and 21 percent are male alcoholics. What is the probability that a random male visitor to the kitchen is an alcoholic?

7. According to a survey, the probability that a family owns 2 cars if their annual income is greater than \$35,000 is 0.75. Of the households surveyed, 60 percent had incomes over \$35,000 and 52 percent had 2 cars. What is the probability that a family has 2 cars and an income over \$35,000 a year?

8. Two events, A and B, are statistically dependent. $P(A) = 0.39$, $P(B) = 0.21$, and $P(A \text{ or } B) = 0.47$. Find the probability that:
 - a. neither A nor B will occur;
 - b. both A and B will occur;
 - c. B will occur, given that A has occurred; and
 - d. A will occur, given that B has occurred.