

5. Emergency Locator Transmitters Use the same ELT data from Exercise 4.

- a. Find the probability of randomly selecting an ELT and getting one manufactured by the Chartair Company.
- b. An ELT is randomly selected and tested. If the test indicates that the ELT is defective, find the probability that it was manufactured by the Chartair Company.

6. Emergency Locator Transmitters Use the same ELT data from Exercise 4. An ELT is randomly selected and tested. If the test indicates that the ELT is *not* defective, find the probability that it is from the Altigauge Company.

7. Pleas and Sentences In a study of pleas and prison sentences, it is found that 45% of the subjects studied were sent to prison. Among those sent to prison, 40% chose to plead guilty. Among those not sent to prison, 55% chose to plead guilty.

- a. If one of the study subjects is randomly selected, find the probability of getting someone who was not sent to prison.
- b. If a study subject is randomly selected and it is then found that the subject entered a guilty plea, find the probability that this person was not sent to prison.

8. Pleas and Sentences Use the same data given in Exercise 7.

- a. If one of the study subjects is randomly selected, find the probability of getting someone who was sent to prison.
- b. If a study subject is randomly selected and it is then found that the subject entered a guilty plea, find the probability that this person was sent to prison.

9. HIV The New York State Health Department reports a 10% rate of infection with the HIV virus for the "at-risk" population. Under certain conditions, a preliminary screening test for the HIV virus is correct 95% of the time. (Subjects are not told that they are HIV infected until additional tests verify the results.) If someone is randomly selected from the at-risk population, what is the probability that they have the HIV virus if it is known that they have tested positive in the initial screening?

10. HIV Use the same data from Exercise 9. If someone is randomly selected from the at-risk population, what is the probability that they have the HIV virus if it is known that they have tested negative in the initial screening?

11. Extending Bayes' Theorem Example 3 in this section included an extension of Bayes' theorem to include three events, denoted by A , B , C . Write an expression that extends Bayes' theorem so that it can be used to find $P(A|Z)$, assuming that the initial event can occur in one of four ways: A , B , C , D .

12. Extensions of Bayes' Theorem In Example 2, we used only the initial events of A and \bar{A} . In Example 3, we used initial events of A , B , and C . If events B and C in Example 3 are combined and denoted as \bar{A} , we can find $P(A|D)$ using the simpler format of Bayes' theorem given in Example 2. How would the resulting value of $P(A|D)$ in Example 3 be affected by using this simplified approach?

13. Biased Coin In an article about confusion of eyewitnesses, John Allen Paulos cites the problem of three coins, one of which is biased so that it turns up heads 75% of the time. If you randomly select one of the coins, toss it three times, and obtain three heads, what is the probability that this is the biased coin?