

19. Redundancy in Computer Hard Drives It is generally recognized that it is wise to back up computer data. Assume that there is a 2% rate of disk drive failure in a year (based on data from various sources, including "Failure Trends in Large Disk Drive Population," by Pinheiro et al. of Google, Inc.).

- If you store all of your computer data on a single hard disk drive, what is the probability that the drive will fail during a year?
- If all of your computer data is stored on a hard disk drive with a copy stored on a second hard disk drive, what is the probability that both drives will fail during a year?
- If copies of all of your computer data are stored on three independent hard disk drives, what is the probability that all three will fail during a year?
- Describe the improved reliability that is gained with backup drives.

20. Redundancy in Aircraft Radios The FAA requires that commercial aircraft used for flying in instrument conditions must have two independent radios instead of one. Assume that for a typical flight, the probability of a radio failure is 0.0035. What is the probability that a particular flight will be threatened with the failure of both radios? Describe how the second independent radio increases safety in this case.

21. Born on the 4th of July For the following, ignore leap years and assume that births on the 365 different days of the year are equally likely.

- What is the probability that a randomly selected person was born on July 4?
- What is the probability that two randomly selected people were both born on July 4?
- What is the probability that two randomly selected people were born on the same day?

22. Hiring Employees Assume that Google, Inc. hires employees on the different business days of the week (Monday through Friday) with equal likelihood.

- If two different employees are randomly selected, what is the probability that they were both hired on a Monday?
- If two different employees are randomly selected, what is the probability that they were both hired on the same day of the week?
- What is the probability that 10 people in the same department were all hired on the same day of the week? Is such an event unlikely?

In Exercises 23–26, use these results from the "1-Panel-THC" test for marijuana use, which is provided by the company Drug Test Success: Among 143 subjects with positive test results, there are 24 false positive results; among 157 negative results, there are 3 false negative results. (Hint: Construct a table similar to Table 4-1, which is included with the Chapter Problem.)

23. Screening for Marijuana Use If 2 of the subjects are randomly selected without replacement, what is the probability that they both had correct test results (either true positive or true negative)? Is such an event unlikely?

24. Screening for Marijuana Use If 2 of the subjects are randomly selected without replacement, what is the probability that they both had incorrect test results (either false positive or false negative)? Is such an event unlikely?

25. Screening for Marijuana Use If 3 of the subjects are randomly selected without replacement, what is the probability that they all had false positive test results? Is such an event unlikely?