1. A class in advanced physics is comprised of 10 juniors, 30 seniors, and 10 graduate students. The final grades show that 3 of the juniors, 10 of the seniors, and 5 of the graduate students received an A for the course. If a student is chosen at random from this class and is found to have earned an A, what is the probability that he or she is a senior?
2. In an experiment to study the relationship of hypertension and smoking habits, the following data are collected for 180 individuals:

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Non-smokers** | **Moderate smokers** | **Heavy smokers** |
| Hypertension | 21 | 36 | 30 |
| No hypertension | 48 | 26 | 19 |

If one of these individuals is selected at random, find the probability that the person is

1. experiencing hypertension, given that the person is a heavy smoker;
2. a non-smoker, given that the person is experiencing no hypertension.
3. A manufacturer of flu vaccine is concerned about the quality of its flu serum. Batches of serum are processed by three different departments having rejection rates of 0.10, 0.08, and 0.12, respectively. The inspections by the three departments are sequential and independent.
4. What is the probability that a batch of serum survives the first departmental inspection but is rejected by the second department?
5. What is the probability that a batch of serum is rejected by the third department?
6. In USA Today (Sept. 5, 1996) the results of a survey involving the use of sleepwear while traveling were listed as follows:

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Male** | **Female** |  |
| Underwear | 0.220 | 0.024 | 0.244 |
| Nightgown | 0.002 | 0.180 | 0.182 |
| Nothing | 0.160 | 0.018 | 0.178 |
| Pajamas | 0.102 | 0.073 | 0.175 |
| T-shirt | 0.046 | 0.088 | 0.134 |
| Other | 0.084 | 0.003 | 0.087 |

1. What is the probability that a traveller is a female who sleeps in nude?
2. What is the probability that a traveller is male?
3. Assuming the traveller is a male, what is the probability that he sleeps in pajamas?
4. What is the probability that a traveller is male if he sleeps in pajamas or a T-shirt?
5. The probability that an automobile being filled with gasoline will also need an oil change is 0.25; the probability that it needs a new oil filter is 0.40; and the probability that both the oil and filter need changing is 0.14.
6. If the oil had to be changed, what is the probability that a new oil filter is needed?
7. If a new oil filter is needed, what is the probability that the oil has to be changed?
8. The probability that a married man watches a certain television show is 0.4 and the probability that a married woman watches the show is 0.5. The probability that a man watches the show, given that his wife does, is 0.7. Find the probability that
9. a married couple watches the show;
10. a wife watches the show given that her husband does;
11. at least one person will watch the show.
12. For married couples living in a certain suburb the probability that the husband will vote on bond referendum is 0.21, the probability that his wife will vote in the referendum is 0.28, and the probability that both husband and wife will vote is 0.15. What is the probability that
13. at least one member of a married couple will vote?
14. a wife will vote, given that her husband will vote?
15. a husband will vote, given that his wife does not vote?
16. The probability that a vehicle entering the Luray Caverns has Canadian license plates is 0.12; the probability that it is a camper is 0.28; and the probability that it is a camper with Canadian license plates is 0.09. What is the probability that
17. a camper entering the Luray Caverns has Canadian license plates?
18. a vehicle with Canadian license plates entering the Luray Caverns is a camper?
19. a vehicle entering the Luray Caverns does not have Canadian plates or it is not a camper?
20. The probability that a doctor correctly diagnoses a particular illness is 0.7. Given that the doctor makes an incorrect diagnosis, the probability that the patient enters a law suit is 0.9. What is the probability that the doctor makes an incorrect diagnosis and the patient sues?
21. In 1970, 11% of Americans completed four years of college; 43% of them were women. In 1990, 22% of Americans completed four years of college; 53% of them were women. (Time, Jan. 19, 1996)
22. Given that a person completed four years of college in 1970, what is the probability that the person was a woman?
23. What is the probability that a woman would finish four years of college in 1990?
24. What is the probability that in 1990 a man would not finish college?
25. A real estate agent has 8 master keys to open several homes. Only 1 master key will open any given house. If 40% of these homes are usually left unlocked, what is the probability that the real estate agent can get into a specific home if the agent selects 3 master keys at random before leaving the office?
26. Before the distribution of certain statistical software every fourth compact disk (CD) is tested for accuracy. The testing process consists of running four independent programs and checking the results. The failure rates for the 4 testing programs are, respectively, 0.01, 0.03, 0.02, and 0.01.
27. What is the probability that a CD was tested and failed any test?
28. Given that a CD was tested, what is the probability that it failed program 2 or 3?
29. In a sample of 100, how many CDs would you expect to be rejected?
30. Given a CD was defective, what is the probability that it was tested?
31. A town has 2 fire engines operating independently. The probability that a specific engine is available when needed is 0.96.
32. What is the probability that neither is available when needed?
33. What is the probability that a fire engine is available is needed?
34. The probability that Tom will be alive in 20 years is 0.7, and the probability that Nancy will be alive in 20 years is 0.9. If we assume independence for both, what is the probability that neither will be alive in 20 years?
35. Suppose an electrical system is given in the diagram below. What is the probability that the system works?



1. A circuit system is given in the diagram below.
2. What is the probability that the entire system works?
3. Given that the system works, what is the probability that the component A is not working?

