
1. (From Midterm 1, Spring 2003, counted 24%) A study of college students finds that while 60 percent of college students are male, only 40 percent of college students with an A average are male. In contrast, 15 percent of female students have an A average. Assuming these results are accurate answer the following questions.
   a) Are “being a male student” and “having an A average” independent? Why?
   b) What is the probability that a randomly selected student has an A average?
   c) What is the probability that a randomly selected male student has an A average?

2. Demonstrate that \( P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(A \cap C) - P(B \cap C) + P(A \cap B \cap C) \). (You may use a Venn diagram or use the rule for \( P(A \cup B) \) and the associative law for unions of sets.)

3. (Question 2.3 in Ramanathan.) Let \( B \) be an event and \( A_1, A_2, ..., A_n \) be \( n \) mutually exclusive events. Define \( A = \bigcup_{i=1}^{n} A_i \). Also assume \( P(A_i) > 0 \) and \( P(B|A_i) = p \) for all \( i \). Show that \( P(B|A) \) is also equal to \( p \). [A Venn diagram might help.]

4. The probability that a person will watch a movie on TV is 0.80. If a person is watching, the probability that the show is taped is one-third. If a person is not watching, the probability that the show will be taped is 0.9. What is the probability that the show will be taped? What is the probability that a show is being watched given that it is being taped?