Homework Quiz 2
Ms362K

Name: Solutions

Answer the question. You may use your HW on this quiz. There is no need to simplify your answers.

1. (4 point) (p. 48, #5) A system is composed of 5 components, each of which is either working or failed. Consider an experiment that consists of observing the status of each component, and let the outcome of the experiment be given by the vector \((x_1, x_2, x_3, x_4, x_5)\), where \(x_i\) is equal to 1 if component \(i\) is working and equal to 0 if it is failed.

   a) How many outcomes are in the sample space?

   \(2^5\)

   b) Suppose the system is working if components 1 and 2 are both working, or if components 3 and 4 are both working, or if components 1, 3, and 5 are working. Let \(W\) be the event that the system will work. Specify all outcomes of \(W\).

   \[ W = \{(10000), (11000), (11010), (11100), (11110), (11111), (10111), (00111)\} \]

   c) Let \(A\) be the event that components 4 and 5 are both failed. How many outcomes are in \(A\)?

   \(8\)

   d) Write out the outcomes in event \(AW\).

   \[ AW = \{(11000), (11100)\} \]
2. (2 points) (p. 49, #11) A total of 28 percent of American males smoke cigarettes, 7 percent smoke cigars, and 5 percent smoke both.

a) What percentage of American males smoke neither cigars nor cigarettes?

\[
P(C) = 0.07 \quad P(S) = 0.28 \quad P(C \cap S) = 0.05
\]

So \[P(C \cup S) = 0.07 + 0.28 - 0.05 = 0.30\]

So \[P(C \cap S') = 0.7 - 0.3 = 0.40\]

b) What percentage smokes cigars but not cigarettes?

\[P(C \cap S') = P(C) - P(C \cup S) = 0.07 - 0.05 = 0.02\]

3. (2 points) (p. 49, #15a) Given a standard 52 deck of cards, what is the probability of being dealt 5 cards of the same suit (this is called a flush)?

\[
\frac{4 \cdot \binom{13}{5}}{\binom{52}{5}}
\]

4. (1 point) (p. 49, #18) Two cards are randomly selected from a standard 52 card deck. What is the probability they form a blackjack, that is one card is an ace, the other is a ten, jack, queen, or king?

\[
\frac{4 \cdot 16}{\binom{52}{2}}
\]

5. (1 point) (p. 50, #23) A pair of fair, 6-sided dice is rolled, one die after the other. What is the probability the second die lands of a higher value than the first?