ECE 353 Probability and Random Signals - Homework 1

Spring 2019
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Q1. An experiment consists of tossing two six sided dice. Assume all outcomes have equal probability

(a) Find the sample space S.

(b) Find the probability of event A that the sum of the dots on the dice equals 6.

(c) Find the probability of event B that the sum of the dots on the dice is greater than 10.

(d) Find the probability of event C that the sum of the dots on the dice is greater than 8 but less than 12.

Q2. In an experiment, A, B, C and D are events with probabilities $P[A] = 1/4$, $P[B] = 1/8$, $P[C] = 5/8$, and $P[D] = 3/8$. Furthermore, A and B are disjoint, while C and D are independent.

(a) Find $P[A \cap B]$, $P[A \cup B]$, $P[A \cap \overline{B}]$, and $P[A \cup \overline{B}]$.

(b) Are A and B independent?

(c) Find $P[C \cap D]$, $P[C \cap \overline{D}]$, and $P[\overline{C} \cap \overline{D}]$.

(d) Are $\overline{C}$ and $\overline{D}$ independent?

Q3. Answer the following questions:

(a) Prove that $P[A \cup B] = P[A] + P[B] - P[A \cap B]$ for any A and B (not necessarily disjoint).

(b) Prove that $P[A \cup B \cup C] = P[A] + P[B] + P[C] - P[A \cap B] - P[A \cap C] - P[B \cap C] + P[A \cap B \cap C]$

Q4.

A number is selected uniformly at random from the set of integers $\{-100, -99, \ldots -1, 0, 1, \ldots, 99, 100\}$ What is the probability that it is divisible by 11, but neither by 3 nor by 5?