Chapter 10 Section 3

MA1020 Quantitative Literacy

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Exercise #4

Two standard dice are rolled. Find the following:

a) the probability that the sum is eight.

b) the probability that at least one of the dice is a five and the sum is eight.

c) the probability that one of the dice is a five given that the sum is eight.

d) the probability that the sum is eight given that at least one of the dice is a five.

Conditional Probability

Definition

Suppose A and B are events in a sample space S and that $P(B) \neq 0$. The conditional probability that the even A occurs, given that the event B occurs, or briefly the probability of A given B, denoted $P(A|B)$, is

$$P(A|B) = \frac{P(A \cap B)}{P(B)}.$$

Exercise #10

A student's name is chosen at random from a college registration list and the student is interviewed. If H is the event that the student completes his or her homework each night, and G is the event that the student gets good grades, then state *in words* what probabilities are expressed by each of the following:

a) $P(H \cap G)$

b) $P(H \cap \overline{G})$

c) $P(G|H)$

d) $P(\overline{G}|H)$

e) $P(G|\overline{H})$

f) $P(\overline{G}|\overline{H})$

Independent Events

When two events are independent, the probability of both occurring equals the product of their probabilities. For independent events A and B,

$$P(A \cap B) = P(A) \times P(B).$$

Exercise #28

Suppose the random-track-selection feature on your MP3 player is malfunctioning so that once a track is played, the same track is twice as likely to be selected next. After setting your MP3 player to randomly play the five tracks, you listen to two songs.

a) Find the probability track 3 plays first.

b) Find the probability track 3 plays second, given that track 3 played first.

c) Are these events independent? Explain your reasoning?