Discussion - Week 3

Example 1 (Event Terminology)

A data set contains information on the employment status and education level of 513 adult California residents (data set is not provided here). One adult is randomly selected from the list. Let A denote the event that the randomly selected adult is employed full-time. Let B denote the event that the randomly selected adult has a Bachelor's degree or higher.

(a) What is the sample space here? What are the simple events?

(b) Express the following in terms of the problem: $A^c, A \cap B, A \cup B, A \cap B^c$.

(c) This part is unrelated to events A and B. Give an example of two events that are disjoint, and two that are not disjoint.

Example 2 (Probability Rules)

The probability that a certain movie will win an award for acting is 0.15, the probability that it will win an award for direcing is 0.23, and the probability that it will win both is 0.09. Find the probabilities of the following.

(a) The movie wins at least one of the two awards.

(b) The movie wins exactly one of the two awards.

(c) The movie wins neither of the two awards.

Example 3 (Factorial)

Notation: $n! = n \times (n-1) \times (n-2) \times \cdots \times 1$

(ex. $3! = 3 \times 2 \times 1 = 6$)

Compute the following:

(a) $5!$

(b) $(18-9)!$

(c) $\frac{8!}{4}$

(d) $\frac{8!}{4!}$

Example 4 (Combinations)

Notation: ${}_nC_k$ and $\binom{n}{k}$ are two ways to denote the number of ways to choose k out of n possibilities if the order of the choices does not matter.

$$ {}_nC_k = \binom{n}{k} = \frac{n!}{(n-k)!k!} $$

Compute the following:

(a) ${}_{10}C_1$

(b) $\binom{7}{3}$

(c) I'm going to draw 2 cards from a shuffled deck of 52 cards. How many possible combinations of two cards are there?

(d) A club has 17 members, and three delegate positions with identical responsibilities. How many ways are there to fill those positions?