Dependent Events

It is important to understand the difference between events that are dependent and those which are independent.

If the probability of the second event is affected by the outcome of the first event, then the two events are dependent.

For example: When drawing an object from a container, you can find the probability of drawing a particular object. If you do not replace the first object before drawing the second, then the second event is dependent on the first.

If A and B are dependent events,
THEN
P (A and B) = P(A) × P(B|A)

Given

Problem A: 4 counters in total

Three red and one white counter are placed in a bag. What is the probability of drawing two red counters, when the first one is <u>not replaced</u> before drawing the second?

Given that you picked a red one already how many red are left

Solution:

P(Red and Red) = P(Red) × P(Red|Red)

$$= \frac{3}{4} \times \frac{2}{3}$$

$$= \frac{6}{12}$$ Reduce

$$= \frac{1}{2}$$

Problem B: 4 counters in total

3 red
1 white

What is the probability of drawing a red followed by a white, if the first one is not replaced before drawing the second?

given that you already pick out Red How many white left

Solution:

P(Red and White) = P(Red) × P(White|Red)

$$= \frac{3}{4} \times \frac{1}{3}$$

$$= 3/12$$ always Reduce

$$= 1/4$$

Without Replacement

P (Ace and Queen)

$$= P(Ace) \times P(Queen \mid Ace)$$

$$\frac{4}{52} \times \frac{4}{51}$$

$$= \frac{16}{2052} = \frac{4}{513}$$

B)

$$P(Ace \text{ and } Ace) = P(Ace) \times P(Ace \mid Ace)$$

$$\frac{4}{52} \times \frac{3}{51}$$

$$12/2052 = 3/513$$

Exercise 3.13 (Without Replacement

#1 ab

2) abc

3) abc

#6 abcd

#7abc