Independence

Section 5

Independent Events

If our knowledge about an event does not tell us anything about the probability of another event occurring, then the two events are independent.

Definition:

Two events A and B are *independent* if $P(A \mid B) = P(A).$ Equivalently, A and B are *independent* if

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

Independent Events

Example:
The chance of winning a prize during Tim Hortons' "Roll Up the Rim to Win" promotion is advertised as 1 in 6.

(a) Suppose that you've purchased 5 coffees during the promotion and have yet to win anything. What is the probability that you will win a prize on the 6th cup that you purchase?

(b) Suppose that you decide to purchase exactly 6 coffees during the promotion. What is the probability that you will win a prize on all 6 cups?

Question

Example #20.

The average efficacy of an oral contraceptive (birth control pill) is about 97.5% per year. This means that, within a year, 2.5% of sexually active women who are taking the pill will get pregnant. What is the probability that a sexually active woman who takes birth control pills will get pregnant **at least** once in a 5-year period?