Two events are *dependent* if one event affects the other. Two events are *independent* if one event has no effect on the other.

Probability for B, dependent on A

If A and B are dependent, then $P(A \text{ and } B) = P(A) \cdot \underbrace{P(B|A)}$.

If A and B are independent, then $P(A \text{ and } B) = P(A) \cdot P(B)$.

Example 1 There are 3 red markers, 4 blue markers, and 5 black markers in a box.

(a) Suppose you choose 2 markers at random, one at a time, with replacement. Find the probability of choosing blue, then black.

Independent

P(Blue & Blk) = P(Blue) x P(Black)

$$\frac{4}{12} \times \frac{5}{12} = \frac{1}{3} \times \frac{5}{12} = \frac{5}{36}$$

(b) Suppose you choose 3 markers at random, one at a time, without replacement. Find the probability of choosing red, then blue, then blue.

Dependent

P(R, B, B) = P(R) & P(B) & P(B)

$$\frac{3}{12} \times \frac{4}{11} \times \frac{3}{10} = \frac{1}{\cancel{4}} \cancel{\times \frac{4}{11}} \times \frac{3}{10}$$

$\frac{3}{110}$

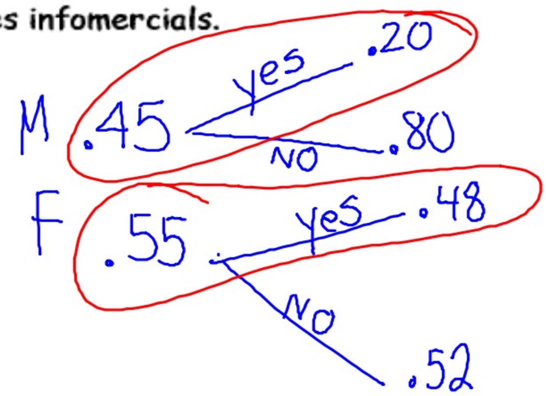
Example 2 The probability of rain ~~in~~ on a certain day is 10% in Placentia and 20% in Laguna Beach. Find the probability that it rains in at least one of the cities.

P & not LB OR not P & LB OR P & LB

$(.1\cancel{0}) \times (.8\cancel{0}) + (.9\cancel{0}) \times (.2\cancel{0}) + (.1\cancel{0}) \times (.2\cancel{0})$

$.08 + .18 + .02 = .28 = 28\%$

Example 3 In a survey of adults 35-60 years old, 45% were males. Twenty percent of the males surveyed admitted they watched infomercials, and 48% of the females admitted watching infomercials. Use a tree diagram to find the probability that a randomly selected adult watches infomercials.



M & yes OR F & yes

$(.45)(.20) + (.55)(.48)$

$+$

$= .354 = 35.4\%$