MATH 1342

Section 2.4

General Probability Rules

Two events are **independent** if knowing that one occurs does not change the probability that the other occurs.

(Note: This is not the same as sets that are disjoint or mutually exclusive)

If E and F are independent events, then $P(E \cap F) = P(E)P(F)$

Example:

If $P(A) = .36$ and $P(B) = .58$ and A and B are independent, what is $P(A \text{ and } B)$?

Dependent Events

Dependent events, the occurrence of one event does have an effect on the occurrence of the other event. The probability $P(E \mid F)$ is read "the probability of event E given event F had already occurred". If E and F are independent, then $P(E \mid F) = P(E)$. If events E and F are dependent then $P(E \mid F) = \dfrac{P(E \cap F)}{P(F)}$.

This means $P(E \cap F) =$

Examples:

A clothing store that targets young customers (ages 18 through 22) wishes to determine whether the size of the purchase is related to the method of payment. A sample of 300 customers was analyzed and the information is below:

	Cash	Credit	Layaway	Total
Under $40	60	30	10	100
$40 or more	40	100	60	200
Total	100	130	70	300

	Cash	Credit	Layaway	Total
Under $40	60	30	10	100
$40 or more	40	100	60	200
Total	100	130	70	300

a. If a customer is selected at random from this group of customers, what is the probability that the customer paid cash?

b. If a customer is selected at random from this group of customers, what is the probability that the customer paid with a credit card?

c. If a customer is selected at random from this group of customers, what is the probability that the customer paid with the layaway plan?

	Cash	Credit	Layaway	Total
Under $40	60	30	10	100
$40 or more	40	100	60	200
Total	100	130	70	300

d. If a customer is selected at random from this group of customers, what is the probability that the customer purchased under $40?

e. If a customer is selected at random from this group of customers, what is the probability that the customer purchased $40 or more?

	Cash	Credit	Layaway	Total
Under $40	60	30	10	100
$40 or more	40	100	60	200
Total	100	130	70	300

f. If a customer is selected at random from this group of customers, what is the probability that the customer paid with a credit card given that the purchase was under $40?

g. If a customer is selected at random from this group of customers, what is the probability that the customer paid with the layaway plan given that the purchase was $40 or more?

Example: P(A) = 0.6 P(B) = 0.3 P(A∪B) = 0.8

Determine the value of P(A∩B)

Determine the value of P(A|B)

Determine the value of P(B|A)

Are events A and B independent?

Examples:

Thirty percent of the students at a local high school face a disciplinary action of some kind before they graduate. Of those "felony" students, 40% go on to college. Of the ones who do not face a disciplinary action, 60% go on to coll

a. What is the probability that a randomly selected student both faced a disciplinary action and went on to college?

b. What percent of the students from the high school go on to college?

c. Show if events {faced disciplinary action} and {went to college} are independent or not.