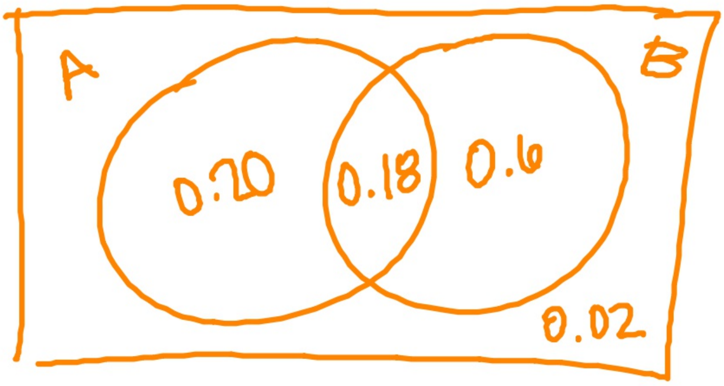
Warm-Up

Complete warm-up side of the worksheet.

Write in Agenda: **Print the Chapter 5 Review Packet found on akstats.weebly.com**



A. $P(A \cup B) =$
$0.2 + 0.18 + 0.6 = 0.98$

B. $P(A \cap B) = 0.18$

C. $P(A \cap B^c) = 0.2$

D. $P(B \cap A^c) = 0.6$

E. $P(A^c \cap B^c) = 0.02$

OR = one or the other or both

2. USE THE FOLLOWING TABLE TO ANSWER THE FOLLOWING QUESTIONS ABOUT STUDENTS FAVORITE TYPE OF SPORT

	FOOTBALL	SOCCER	BASKETBALL	SWIM	TENNIS	OTHER	TOTAL
MALE	30	20	40	5	15	5	115
FEMALE	5	20	20	30	15	5	95
TOTAL	35	40	60	35	30	10	210

WHAT IS THE PROBABILITY IF I RANDOMLY SELECT A STUDENT OF THE FOLLOWING

A. THE STUDENT IS A MALE

$P(\text{male}) = 115/210$

B. THE STUDENTS FAVORITE SPORT IS FOOTBALL

$P(\text{football}) = 35/210$

C. THE STUDENT IS A MALE AND LIKES FOOTBALL

$P(\text{male} \cap \text{football}) = 30/210$

D. THE STUDENT IS A MALE OR LIKES FOOTBALL

$P(\text{male} \cup \text{football}) = 120/210$

E. THE STUDENTS LIKES FOOTBALL OR BASKETBALL

$P(\text{football} \cup \text{bball}) = 95/210$

F. THE STUDENT IS A FEMALE

$P(\text{female}) = 95/210$

G. THE STUDENT LIKES SWIMMING

$P(\text{swim}) = 35/210$

H. THE STUDENT IS A FEMALE AND LIKES SWIMMING

$P(\text{fem} \cap \text{swim}) = 30/210$

I. THE STUDENT IS A FEMALE OR LIKES SWIMMING

$P(\text{fem} \cup \text{swim}) = 100/210$

$P(\text{fem}) + P(\text{swim}) - P(\text{fem} \cap \text{swim})$

$\frac{95}{210} + \frac{35}{210} - \frac{30}{210} = \frac{100}{210}$

J. THE IS A FEMALE GIVEN THEY LIKE SWIMMING

$P(\text{fem} | \text{swim}) = \frac{30}{35}$

K. THE STUDENT LIKES SOCCER

$P(\text{soccer}) = 40/210$

L. THE STUDENT LIKES SOCCER OR SWIMMING

$P(\text{soccer} \cup \text{swim}) = 75/210$

1. A roulette wheel has 38 slots, numbered 0, 00, and 1 to 36. The slots 0 and 00 are colored green, 18 of the others are red, and 18 are black. The dealer spins the wheel and at the same time rolls a small ball along the wheel in the opposite direction. The wheel is carefully balanced so that the ball is equally likely to land in any slot when the wheel slows.

(a) What is the probability that the ball will land in any one slot?

$P(\text{any slot}) = 1/38$

(a) If you bet on "red," you win if the ball lands in a red slot. What is the probability of winning?

$P(\text{red}) = 18/38$

(c) Another bet is that the ball lands on any multiple of 3 (this is called a column bet).

What is the probability of winning a column bet?

$P(\text{column}) = 12/38$

2. The 2000 Census identified the ethnic breakdown of the state of California to be approximately as follows: Whites: 46%, Latino: 32%, Asian: 11%, Black: 7%, and Other: 4%. Assuming that these are mutually exclusive categories, what is the probability that a randomly selected person from the state of California is of Asian or Latino descent?

$P(\text{As.} \cup \text{Lat}) = 0.11 + 0.32 = 0.43$

3. You own an unusual die. Three faces are marked with the letter "X," two faces with the letter "y," and one face with the letter "Z." What is the probability that at least one of the first two rolls is a "Y"?

$1 - P(\text{no Y}) = 1 - [(4/6)(4/6)] = 5/9$

4. You roll two six-sided dice

a). Use a chart to create the sample space for the sum of the two dice.

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

8.

b). Find the probability that the sum is 6.

$P(S=6) = \frac{5}{36}$

c). Find P(S < 10)

$P(S<10) = 30/36$

9.

d). Find P(S = odd)

$P(odd) = \frac{18}{36}$

e). Find P(S < 10 and odd)

$P(S<10 \cap odd)$

$= \frac{16}{36}$

f). Find P(S < 10 ~~and~~ or odd)

$P(S<10 \cup odd)$

$\frac{30}{36} + \frac{18}{36} - \frac{16}{36} = \boxed{\frac{32}{36}}$

6. Suppose that, on a planet far away, the probability of a girl being born is 0.6, and it is socially advantageous to have three girls. How many children would a couple have to have, on average, until they had three girls? Describe and conduct five trials of a simulation to help answer this question. *(Use the second row on the table)* Let girls be represented by 0-5 & boys 6-9. Start at 102 & select 1-digit #s until there are 3 girls (#s b/w 0+5). Count th # of children in the trial.

1: 7, 3, 6, 7, 6, 1, 7, 1 (8) 3: 0, 0, 0 (3)
2: 5, 0, 9, 9, 4, (5) 4: 1, 9, 2, 7, 2 (5) 5: 7, 7, 5, 9, 4 (5)

7. Call a household prosperous if its income exceeds \$100,000. Call the household educated if the householder completed college. Select an American household at random, and let A be the event that the selected household is prosperous and B the even that it is educated. According to the Census Bureau, P(A)=0.134, P(B)=0.254, and the joint probability that a household is both prosperous and educated is P(A and B)=0.080. What is the probability P(A or B) that the household selected is either prosperous or educated?

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$
$$= 0.134 + 0.254 - 0.080 = 0.308$$

8. An automobile manufacturer buys computer ships from a supplier. The supplier sends a shipment containing 5% defective chips. Each chip chosen from this shipment has probability 0.05 of being defective, and each automobile uses 12 chips selected independently. What is the probability that all 12 chips in a car will work properly?

$$P(\text{all } 12) = (.95)^{12} = 0.5404$$

5.3 (Conditional Probabilities [Part 1])

P(A | B) = the probability of A given B happens

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

Ex). The two-way table below represents the distribution of gender & their movie genre preferences.

	Comedy	Drama	Action	Romance	Totals
Male	50	40 +	60	25	175
Female	50	70	25	50	195
Totals	100	110	85	75	370

a) Find P(Male | Comedy)

50/100

b) Find P(Comedy | Male)

50/175

c) Find P(Drama | Female)

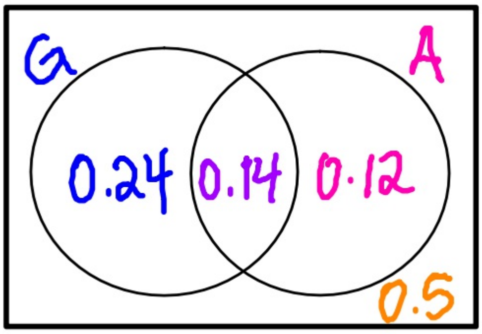
70/195

d) Find P(Drama OR Action | Male)

100/175

At a certain university, 38% of its student body participates in Greek societies, 26% participate in academic societiies, with 14% particpating in both. Let G = a student participates in a Greek society and A = a student participates in an academic society.

a). Construct a Venn diagram for this scenario.



Using proper notation, find the following probabilities:

b) the probability that a student is in a Greek society or in an academic society

$P(G \cup A) = 0.24 + 0.14 + 0.12 = 0.5$

c) the probability that a student is in both

$P(G \cap A) = 0.14$

d) the probability that the student is only in a Greek Society

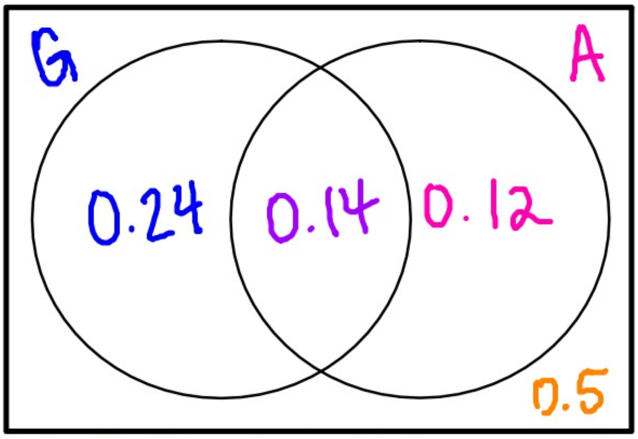
$P(G \cap A^c) = 0.24$

e) the probability that the students is only in an Academic Society

$P(A \cap G^c) = 0.12$

f) the probability that the student is in neither

$P(A^c \cap G^c) = 0.5$



$1-0.38=0.62$

a. The probability that the student is in an academic society given that he is in a Greek society.

$$P(A|G)=\frac{P(A\cap G)}{P(G)}=\frac{0.14}{0.38}=0.368$$

b. The probability that the student is in an academic society given that he is not in a Greek society.

$$P(A|G^c)=\frac{P(A\cap G^c)}{P(G^c)}=\frac{0.12}{0.62}=0.19$$

c. The probability that the student is not in an academic society given that he is in a Greek society.

$$P(A^c|G)=\frac{P(A^c\cap G)}{P(G)}=\frac{0.24}{0.38}=0.632$$

d. The probability that the students is in a Greek Society given that he is in an academic society.

$$P(G|A)=\frac{P(G\cap A)}{P(A)}=\frac{0.14}{0.26}=0.53$$

Independent Events

Events A and B are said to be **independent** if $P(A|B) = P(A)$.
-B occurring should not affect the probability of A.

Multiplication Rule for Independent Events
$P(A \text{ and } B) = P(A)*P(B)$

Multiplication Rule for Dependent Events
$P(A \text{ and } B) = P(A)*P(B|A)$

Sheila has applied to both Clemson and the University of Florida. She thinks the probability that Clemson will admit her is 0.3, the probability that Florida will admit her is 0.8, and the probability that both will admit her is 0.2. Let A = Clemson and B = Florida.

a. Make a Venn diagram with the probabilities given marked.

Turn in on a notecard

b. What is the probability that only Florida will admit her?

c. What is the probability that she will get into either school?

d. What is the probability that she will get into neither school?

e. What is the probability that she gets into Clemson but not Florida?

f. What is the probability she gets into Florida given that she get into Clemson?

g. What is the probability she get into Florida given that she does not get into Clemson?

Classwork

Complete the rest of the worksheet.

Homework

pg. 329 #64, 68, 70, 95, 96

+ print Ch. 5 Review