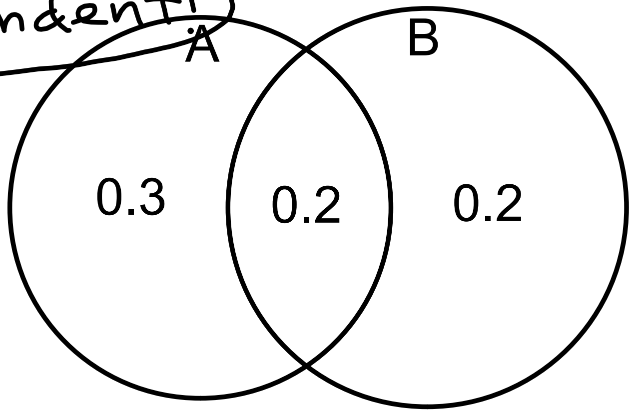
Bellwork: Are events A and B independent, ~~mutually exclusive~~ or neither?

Independent!

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



$.2 = (.5)(.4)$

$.2$

5) $P(J) = .8,\ P(K) = .7$

$P(J \cup K) = .94 = P(J) + P(K) - P(J \cap K)$

$.94 = .8 + .7 - (.8)(.7)$

$.94$, so K & J are independent!

7d) totals/ marginal values

4) $P(G \cap H) = 0 = P(G) \cdot P(H)$

$P(H) = 0 \qquad 0 = .9\,P(H)$

Homework 7.3 Solutions

1. $P(B) = 0.4$
2. $P(C \cup D) = 0.76$
3. $P(E \cap F) = 0.12$
4. $P(H) = 0$
5. J and K are independent since $P(J \cup K) = P(J) + P(K) - P(J) \bullet P(K)$

   $0.94 = 0.8 + 0.7 - (0.8)(0.7)$
6. L and M are <u>not</u> independent since $P(L \cup M) \neq P(L) + P(M) - P(L) \bullet P(M)$

   $0.89 \neq 0.1 + 0.9 - (0.1)(0.9)$

7.

   a. Water and Hamburger are <u>not</u> independent since $P(\text{Water} \cap \text{Hamburger}) \neq P(\text{Water}) \bullet P(\text{Hamburger})$

   $$\frac{45}{400} \neq \left(\frac{123}{400}\right)\left(\frac{191}{400}\right)$$

   b. No Drink and Hot Dog are independent since $P(\text{No Drink} \cap \text{Hot Dog}) = P(\text{No Drink}) \bullet P(\text{Hot Dog})$

   $$\frac{46}{400} = \left(\frac{100}{400}\right)\left(\frac{184}{400}\right)$$

   c. No Drink and No Food are mutually exclusive since $P(\text{No Drink} \cap \text{No Food}) = 0$

★ 8. nce it will help them know approximate quantities of each item needed.

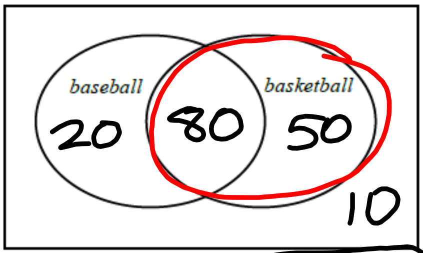
   a. Neither
   b. Mutually Exclusive
   c. Independent

Today's Objectives:

Review for Unit 7 Test

Don't forget to make your notecard!

1. Molly polls the pep club to see which sport they like. She finds that 20 students like baseball only, 50 students like basketball only, and 80 students like baseball and basketball. There were 10 students who didn't like either of those two sports. Fill in the Venn Diagram below with counts according to Molly's survey.

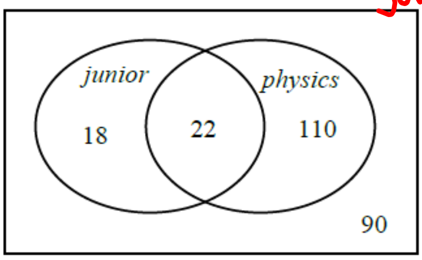


2. Referring again to Molly's survey, if a student from the club is chosen randomly, find *P*(like baseball | like basketball).

$$P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{80}{130} = \boxed{\frac{8}{13} = .61}$$

3. A survey was conducted among a group of students in which it was noted whether or not a student was a *junior* and whether or not the student was enrolled in an *physics* class. The Venn Diagram below shows counts of students based on the results of this survey. If a student from this survey was selected randomly, find *P*(~~senior~~ junior).

$$\frac{40}{240} = .\overline{16}$$



4. Using the Venn Diagram from the previous problem, would the events *junior* and *physics* best be described as independent, ~~mutually exclusive,~~ or neither?

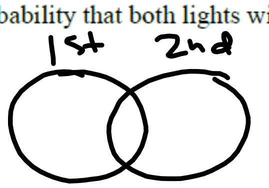
$$\underset{\text{Junior}}{P(A)} \cdot \underset{\text{Physics}}{P(B)} = P(A \cap B)$$

$$\frac{40}{240} \cdot \frac{132}{240} = \frac{22}{240}$$

$.09166 \quad .09166$

Independent

5. Steve drives through 2 traffic lights on his way to school. The traffic lights operate <u>independently</u>. The probability that the first light is red for Steve is 0.6 and the probability that the second light is red for Steve is 0.5. What is the probability that both lights will be red for Steve?



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

$$\boxed{.3} = (.6)(.5)$$

6. Using the information from the previous problem, what is the probability that neither light will be red for Steve?

$$1 - P(A) = P(A^c)$$

$$1 - .6 = .4$$

$$1 - .5 = .5$$

$$(.4)(.5) = \boxed{.2}$$

7. Suppose you roll two standard six-sided dice and sum the two values. Find each probability. *Hint: Use grid*

	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

A. *P*(sum of 12)

$$\frac{1}{36} = .027$$

B. *P*(sum of 5)

$$\frac{4}{36} = .\overline{1}$$

8. A student visited a parking lot containing 160 cars and noted whether or not each car was foreign-made and whether or not the color of each car was red. Although the two-way table is mostly blank, here are some probabilities associated with randomly choosing one car from the parking lot. Use these probabilities to help you fill in the table with the appropriate counts.

	red	not red	TOTALS
foreign	52	32	84
not foreign	36	40	76
TOTALS	88	72	160

$P(\text{not foreign} \mid \text{not red}) = \frac{40}{72}$ $P(\text{foreign} \cap \text{red}) = \frac{52}{160}$ $P(\text{not red}) = \frac{72}{160}$

$$\frac{(nf \cap nr)}{nr}$$

9. The two-way table at the right shows counts of people in a recent survey by gender and favorite primary color. If a person participating in the survey is selected at random, find $P(\text{Yellow}^c)$.

	Red	Blue	Yellow	Totals
Female	25	21	15	61
Male	15	14	10	39
Totals	40	35	25	100

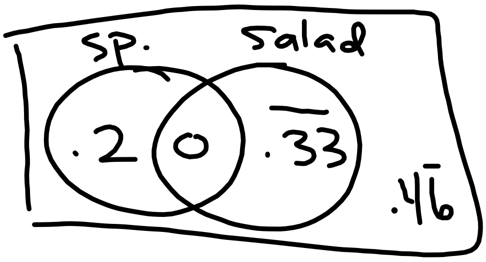
$$1 - P(\text{Yellow}) = 1 - \frac{25}{100}$$
$$= .75$$

10. Using the two-way table from the previous problem, would the events Red and Male be best described as Independent, ~~Mutually Exclusive~~, or Neither?

Neither

$$P(M \cap R) = P(M) \cdot P(R)$$
$$\frac{15}{100} \qquad \frac{39}{100} \cdot \frac{40}{100}$$
$$.15 \qquad .156$$

11. Glenda eats lunch at a Joe's Café everyday. Suppose on any given day there is a $\frac{1}{5}$ chance she will order the special and a $\frac{1}{3}$ chance she will order the big salad. If these two events are mutually exclusive, what is the probability that Glenda will order neither of these two lunch options?



$1 - P(\text{salad} \cup \text{special})$

$1 - .5\overline{3} = .4\overline{6}$