## Chapter 5
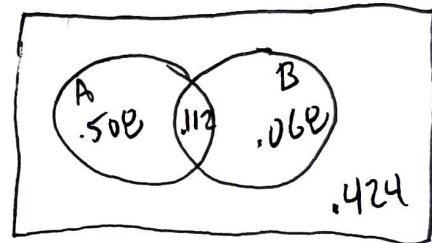
KEY

1. Which of the following is an incorrect statement?

   a. When rolling a dice, the sum of the probabilities of all possible outcomes is always 1.

   (b) The probability of finding a $100 bill on the floor of the hallway is -0.0034
   
   CANNOT BE NEGATIVE

   c. If the probability of a student missing school is 0.056, the probability of them attending is 0.944.    ASSUMING THAT THERE IS NOT A THIRD OPTION.

   d. If tossing heads or tossing tails are mutually exclusive events, and the probability of each outcome is 0.48, the probability of tossing heads or tails is 0.96.

   e. If gender and weight at birth are independent, and the probability of a baby weighing over 8 lbs is 0.167, the probability of a male baby weighing under 8 lbs is 0.833.

2. Two events, A and B have the following probabilities. $P(A) = 0.62$, $P(B) = 0.18$.

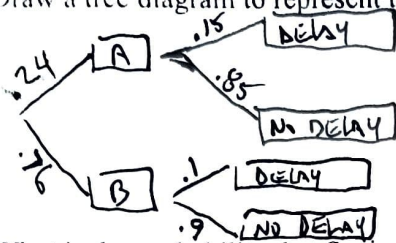   The $P(A \cap B) = 0.112$. Which of the following is true?

   a. A and B are dependent.   WE DON'T KNOW

   ✗ A and B are complementary.

   c. A and B are independent.   WE DON'T KNOW

   ✗ A and B are mutually exclusive.

   (e) Sufficient information has not been given to draw a conclusion.

   ROAST ME

1. Suzie can take two routes to work in the morning, route A or B. If she takes route A, she has a 0.15 chance of experiencing delays. If she takes route B, she has a 0.9 chance of not experiencing delays. The probability of Suzie taking route A is 0.24.

   a. Draw a tree diagram to represent the situation.



   b. What is the probability that Suzie will experience delays?

   $$P(DELAY) = (.24)(.15) + (.76)(.1)$$
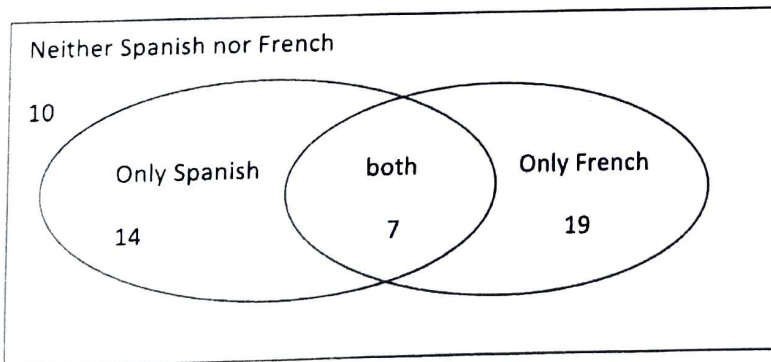   $$= .036 + .076$$
   $$P(DELAY) = .112$$

   c. To avoid delays, which route should Suzie choose? Explain.

   ROUTE B WOULD BE BEST

   P(NOT BEING DELAYED | ROUTE A) = .85

   P(NOT BEING DELAYED | ROUTE B) = .9

2. The following Venn diagram represents the language classes taken by a group of 50 high school students.



   a. Are the events "Spanish" and "French" mutually exclusive? Are they independent?

   * NOT MUTUALLY EXCLUSIVE AS THE INTERSECT

   * INDEPENDENT: THE PROBABILITY OF SPEAKING ONE LANGUAGE DOES NOT CHANGE THE PROBABILITY OF CHANGING THE OTHER.
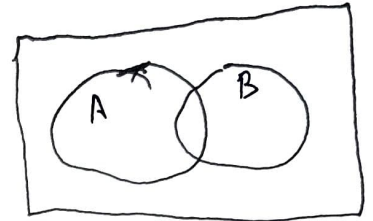
# EXTRA CREDIT: WHAT IS WRONG WITH MY ANSWER?

b. What is the probability that a student is taking French, given that they are taking a language?

$$P(\text{FRENCH} \mid \text{TAKING A LANGUAGE})$$

EXAMPLE

$$P(\text{FRENCH} \mid \text{TAKING LANGUAGE}) = \frac{P(B \cap A)}{P(A)}$$

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

$$= \frac{7/50}{21/50} = \frac{.14}{.42}$$

$$\boxed{P(\text{FRENCH} \mid \text{TAKING LANGUAGE}) = .333}$$

|  | YES | NO |  |
|---|---|---|---|
| FRENCH | 86 | 24 | 50 |
| SPANISH | 21 | 29 | 50 |
|  | 47 | 53 |  |
|  | 26 |  |  |
|  | 40 |  |  |

| LANGUAGE | Fren | Sp |
|---|---|---|
| Y. |  | 26 | 24 |
| N |  |  |  |
|  | 7 | 7/50 |
| 33 | 40/50 |