## Lesson #23 · Topic 2D · Practice

Name _____

1. For the board game Scrabble, there are 100 tiles placed in a bag, each containing a different letter. There are 9 tiles of the letter A.

   a. If two tiles are drawn randomly with replacement, what is the probability of getting a letter A, followed by a letter A?

   b. For this scenario, are the results of the two tiles independent? Explain.

   c. If two tiles are drawn randomly without replacement, what is the probability of getting a letter A, followed by a letter A?

   d. For the scenario in part (c), are the results of the two tiles independent? Explain.

2. A cooler contains 27 cans of soda. Eleven of the cans contain caffeinated sodas, and the rest contain noncaffeinated sodas. Jim randomly selects two cans from the cooler for him and his friend. What is the probability that neither of the two drinks are caffeinated? Show your work.

3. On a January day in Michigan, the weather channel predicts that there is a 70% chance of snow accumulations of at least 12 inches overnight. If at least 12 inches of snow accumulates, there is a 65% chance of a snow day on the following day. If less than 12 inches of snow accumulates, there is an 8% chance of a snow day.

   a. Make a tree diagram to model this chance process.

   b. What is the probability that there is a snow day tomorrow?

   c. If there was a snow day, what is the probability that there were snow accumulations of at least 12 inches?

4. According to survey results from the Pew Research Center, 30% of people made New Year's resolutions. Of the 5,140 people who were surveyed, 16% were in the 18-29 age bracket. Of the people who were surveyed, 7.9% were in the 18-29 age bracket and made New Year's resolutions. Suppose that a person from the survey is randomly selected.

   a. Are the events "Made a New Year's resolution" and "18-29 years old" independent? Justify your answer.

   b. Is a person between the ages of 18-29 more likely, less likely, or equally likely to make a New Year's resolution than all survey responders? Explain.

5. Joel often flies with United Airlines from Grand Rapids, Michigan to Los Angeles, California, which requires him to have a layover and make a connecting flight. About 22% of United flights are delayed, including connecting flights when the first flight is not delayed. If Joel's first flight is delayed, there is a 34% chance his second flight is also delayed.

   a. Are the departure times for Joel's first and second flights independent? How do you know?

   b. What is the probability that at least one of his two flights is delayed? Show your method.

   c. Suppose Joel takes 3 trips from Grand Rapids to Los Angeles (and back) in the month of March. What is the probability that at least one of his twelve flights is delayed? Show your method.

6. A nonprofit foundation is hosting a Pi Day Pi K running race. After the event, they report:

   - 45% of runners who registered for the Pi Day Pi K race had never participated in a race before.
   - Of the runners who had participated in a race before, 90% completed the Pi Day Pi K.
   - Of the runners who had never participated in a race before, 80% completed the Pi Day Pi K.

   What percent of the runners who completed the Pi Day Pi K had never participated in a race before?

7. For two independent events, $F$ and $G$ , it is known that $P(F) = 0.8$ and $P(F \text{ and } G) = 0.24$ . Which of the following statements is true?

A) $P(G) = 0.06$

B) $P(G) = 0.20$

C) $P(F|G) = 0.30$

D) $P(F \text{ or } G) = 0.86$

8. Sarah goes to a particular café every day for several months and notices that they are often out of certain items, so she starts collecting some data. She finds that when she goes to the café around 3 PM, there is a 0.08 probability that the café is out of regular coffee, a 0.11 probability that it is out of decaf coffee, and a 0.15 probability that it is out of tea. Suppose the drink selections are available independent of one another. On a randomly selected day around 3 PM, what is the probability that all three drinks are available?

A) Less than 0.01

B) 0.304

C) 0.340

D) 0.696