Table Number: _____ Group Name: _____

Group Members: _____ _____ _____

Sample Spaces, Probability, and Mutually Exclusive vs Independence

PRACTICE WITH SAMPLE SPACES

For each of the situations listed below, determine the sample space. Write your answer using set notation.

1. Two fair coins (one dime and one penny) are tossed and the outcomes (Heads or Tails) on each are recorded.

2. Suppose a container has 14 marbles: 2 yellow, 4 white, and 8 blue. An experiment consists of drawing one marble and noting its color.

3. An unprepared student takes a short three question true or false quiz in which he guesses the answers to all three questions.

4. Ann (A), Ben (B), Carla (C), Dave (D), and Eugene (E) are five members of a student club. They decide to choose the two members of the club to serve on a committee by random drawing. Five slips of paper are marked with the five student names and are placed in a box. After mixing, two slips of paper are drawn.

5. When a button is pressed, a computer program outputs a random odd number greater than 1 and less than 9. An experiment requires you to press the button twice.

6. Suppose a container has 6 marbles: 3 white, 2 green, and 1 yellow. An experiment consists of drawing one marble noting its color and then drawing a second marble and noting the color <u>with</u> replacement.

7. Suppose a container has 6 marbles: 3 white, 2 green, and 1 yellow. An experiment consists of drawing one marble noting its color and then drawing a second marble and noting the color <u>without</u> replacement.

8. Two fair 4-sided dice, each labeled 1, 2, 3, and 4, are rolled and the outcomes on each are recorded.

PROBABILITY NOTATION

Suppose a survey is administered to a group of individuals about their Twitter usage. Let A and B represent the following events.

A: The selected person is a teenager (12 to 17 years old)
B: The selected person uses Twitter daily.

Assume that every individual is at least 12 years old. Translate the following statements symbolically using probability notation.

9. The probability that a randomly selected respondent is a teenager and uses Twitter daily.	
10. The probability that a randomly selected teenager will use Twitter daily.	
11. The probability that a randomly selected respondent is an adult.	
12. The probability that a randomly selected respondent is a teenager or will use Twitter daily.	
13. The probability that a randomly selected respondent uses Twitter daily given that they are a teenager.	
14. The probability that a randomly selected respondent who uses Twitter daily is a teenager.	
15. The probability that a randomly selected respondent is not a daily Twitter user.	
16. The probability that a randomly selected respondent is not a daily Twitter user and is not a teenager.	
17. The probability that a randomly selected respondent is a teenager or is not a daily Twitter user.	
18. The probability that a randomly selected daily Twitter user is a teenager.	

PROBABILITIES FROM TWO-WAY TABLES

The following represents the make of car owned by a random sample of college students from three different universities. Find the following probabilities and round answers to the nearest thousandths.

	Chevrolet	Ford	Honda	Toyota	Totals
Kent State University	125	66	70	95	356
Ohio State University	75	46	85	116	322
University of Akron	80	50	71	61	262
Totals	280	162	226	272	940

19. What is the probability that a randomly selected student is an Ohio State University student and owns a Honda?

20. What is the probability that a randomly selected student owns a Ford or attends Kent State University?

21. What is the probability that a randomly selected student owns a Chevrolet given that the student attends Ohio State University?

22. What is the probability that a randomly selected Kent State University student owns a Chevrolet?

23. What is the probability that a randomly selected student does not attend the University of Akron?

24. What is the probability that a randomly selected student owns a Toyota or a Chevrolet?

25. What is the probability that a randomly selected Toyota owner is a University of Akron student?

26. What is the probability that a randomly selected student who owns a Ford attends Ohio State University?

27. What is the probability that a randomly selected student attends either Kent State University or the University of Akron?

28. Suppose that events A and B are mutually exclusive. If P(A) = 0.27 and P(B) = 0.51, find the following. Round answers to the nearest hundredths, if necessary.
    a) P(A AND B) =

    b) P(A OR B) =

    c) P(B^C) =

29. Suppose that events A and B are independent. If P(A) = 0.63 and P(B) = 0.19, find the following. Round answers to the nearest ten thousandths, if necessary.
    a) P(A AND B) =

    b) P(A OR B) =

    c) P(A^C) =

30. Suppose that events A and B are complementary. If P(A) = 0.23, find the following.
    a) P(B) =

    b) P(A AND B) =

    c) P(A OR B) =

31. Suppose that events A and B are such that P(A) = 0.25, P(B) = 0.42, and P(A AND B) = 0.15. Answer the following. Round answer to the nearest hundredth, if necessary.
    a) P(A OR B) =

    b) P(A|B) =

    c) P(B|A) =

    d) P(A^C) =

    e) P(B^C) =

    f) Are events A and B mutually exclusive? Explain why or why not.

    g) Are events A and B independent? Explain why or why not.

    h) Are events A and B complementary? Explain why or why not.

MUTUALLY EXCLUSIVE, COMPLEMENTARY, AND INDEPENDENT EVENTS

For the situations below, determine if events A and B are mutually exclusive, complementary, independent, or associated. Choose the ***BEST*** answer. Explain how you know.

32. Suppose A and B are events such that P(A) = 0.5; P(B) = 0.6, and P(A AND B) = 0.21.

33. Suppose you randomly select one Ohio voter. Suppose A = selecting a Democrat and B = selecting a Republican.

34. One card is randomly selected from a standard deck of playing cards. Suppose A = selecting a diamond and B = selecting a face card.

35. One card is randomly selected from a standard deck of playing cards. Suppose A = selecting a spade and B = selecting a red card.

36. Suppose you roll one fair six-sided die and record the outcome. Suppose A = rolling an even number and B = rolling a number greater than 3.

37. Suppose you roll one fair six-sided die and record the outcome. Suppose A = rolling a number at least 4 and B = rolling a number at most 3.

38. Suppose you roll one fair six-sided die twice and record each outcome. Suppose A = rolling a 6 on the first roll and B = rolling a 6 on the second roll.