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UNIT 6: Probability Review

1) The local Chamber of Commerce conducted a survey of one thousand randomly selected shoppers at a mall. For all shoppers, "gender of shopper," and "items shopping for" was recorded. The data collected is summarized in the following table:

Items shopping for

	Clothing	Shoes	Other	Total
Male	75	25	150	250
Female	350	230	170	750
Total	425	255	320	1000

If a shopper is selected at random from this mall,

a) What is the probability that the shopper is a female?

b) What is the probability that the shopper is female or shopping for shoes?

c) What is the probability that the shopper is a female shopping for shoes?

d) What is the probability that the shopper is shopping for shoes given that the shopper is a female?

2). Andrea is a very good student. The probability that she studies and passes her math test is 17/20. If the probability she studies is 15/16, whats the probability that she passes the math test, given that she studied.

3). Alex is not a good student and doesn't like to go to school if its raining. If it rains, he goes to school 15% of the time. If its not raining, there is a 90% chance he will go to school. There is a 22% chance that it will not rain. What is the probability that Alex will go to school tomorrow?

4). On a menu, there are sandwiches on wheat bread (2 with turkey, 3 with ham) and on white bread (1 with turkey, 2 with chicken, 2 with ham). Using a tree diagram, find the probability of your friend deciding to treat you to a sandwich and picking you a ham sandwich on white bread.

5). In a survey of pet owners, 45% own a dog, 27% own a cat and 12% own both. What is the conditional probability that a dog owner also owns a cat?

6) Consider the set {red, orange, yellow, green, blue, purple, pink, black}:

A = {red, blue, black} B = {red, yellow, orange} C = {red, yellow, green, pink}

a) Find $A \cup B$

b) Find $A \cap B$

c) Find $A \cap C$ - B

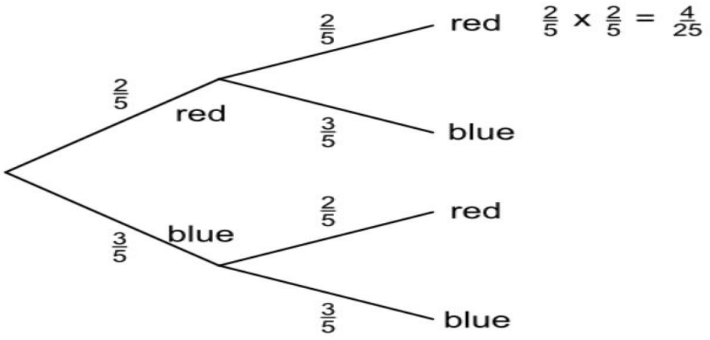
d) Find A' $\cap$ C

e) Find (A $\cap$ C)'

7)

a) A box has 2 red squares and 3 blue squares. Pick, replace and pick again.
Complete the tree diagram and find

P(one of each color) =



b). A box has 7 blue and 8 green donuts. pick one, eat it and pick another. Make a tree diagram to help you and find

P(at least one green) =

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8) There are 8 blue marbles, 9 orange marbles, and 6 yellow marbles in a bag. It is equally likely that any marble will be drawn from the bag.

a) What is the probability of drawing a blue marble?
b) If three marbles are drawn (without replacement), what is the probability of drawing all orange marbles?
c) If one marble is drawn, what is the probability of not drawing a yellow marbles?
d) What is the probability of drawing a blue or an orange marble, replacing it, and doing it again?

Use the table below to find each probability. The table gives information about students at one school.

Favorite Leisure Activities

	Sports	**Hiking**	**Reading**	**Phoning**	**Shopping**	**Other**
Female	39	48	85	62	71	29
Male	67	58	76	54	68	39

9. *P*(sports | female)

10. *P*(reading | male)

11. *P*(hiking | female)

12. *P*(male | shopping)

13. *P*(female | sports)

14. *P*(male | reading)

15. *P*(hiking | male)

16. *P*(female | shopping)

17. Are the following events independent or dependent?

a. P(A) = 3/5 P(B) = 1/5 P(A and B) = 3/10

b. P(A) = ¾ P(not B) = 3/5 P(A and B) = 3/10

c. P(A) = 1/6 P(B) = 2/3 P(B|A) = 5/6

18. In a classroom of 35 kids, 19 take math and 25 take gym. How many students take math, but not gym?

Use for #19 & 20: In a bag of skittles there are 8 pink, 13 green, 7 yellow and 10 red. When I actually went for a handful, I blindly dumped 3 red, 1 yellow, 2 pink and 7 green into my hand.

19. What was the theoretical probability of me picking a green skittle?

20. What was the experimental probability of me picking a green skittle?

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ANSWER KEY

1)

a) P(female) = 750 / 1000 = 0.75

b) P(shopping for shoes) = 255 / 1000 = 0.255

c) P(female and shopping for shoes) = 230 / 1000 = 0.23

d) P(shopping for shoes | female) = 230 / 750 = 0.3067

e) There are 230 females shopping for shoes. Therefore, the events "female" and "shopping for shoes" are not disjoint.

f) P(shopping for shoes | female) = 0.3067 and P(shopping for shoes) = 0.255. Since these two probabilities are not ≠, events "female" and "shopping for shoes" are not independent.

2)

3)

4)

5)

6) Consider the sets: A = {red, green, blue} B = {red, yellow, orange}
C = {red, orange, yellow, green, blue, purple}

a) Find $A \cup B$

The union contains all the elements in either set: $A \cup B$ = {red, green, blue, yellow, orange}
Notice we only list red once.

b) Find $A \cap B$

The intersection contains all the elements in both sets: $A \cap B$ = {red}

c) Find $A^c \cap C$

Here we're looking for all the elements that are *not* in set A and are also in C.
$A \cap C$ = {red, green, blue}

d).

e).

7)