

Review for Unit Exam - Sets and Probability

Some questions require more time than others. However, the average should be 2 minutes per question. If there are 30 questions, that means 1 hour.

If you cannot complete a question without help, review that topic and try again.

For probability questions, please give your answer as a fraction or decimal accurate to 3 decimal places.

1.

Let S be the universal set, where:

$$S = \{1,2,3, \dots, 18,19,20\}$$

Let sets A and B be subsets of S , where:

$$\text{Set } A = \{2,5,13,16,17,20\}$$

$$\text{Set } B = \{2,5,17\}$$

Find the following:

LIST the elements in the set $(A \cup B)$:

$$(A \cup B) = \{ \}$$

Enter the elements as a list, separated by commas. If the result is the empty set, enter **DNE**

LIST the elements in the set $(A \cap B)$:

$$(A \cap B) = \{ \}$$

Enter the elements as a list, separated by commas. If the result is the empty set, enter **DNE**

You may want to draw a Venn Diagram to help answer this question.

2.

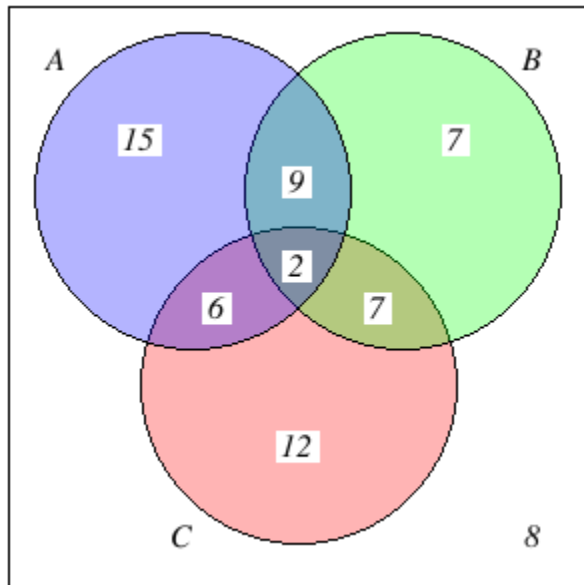
Let the Universal set $U = \{\text{letters of the alphabet a through j}\}$.

Let $A = \{c, g, h, j\}$, $B = \{d, f, g, h\}$, and $C = \{a, d, h, j\}$

List the elements of the set $(A \cap B) \cup C$

3.

The Venn diagram here shows the cardinality of each set. Use this to find the cardinality of each given set.



$$n(A) =$$

$$n(A \cap C) =$$

$$n(A \cap B \cap C^c) =$$

4. A survey was given asking whether they watch movies at home from Netflix, Redbox, or a video store. Use the results to determine how many people use Redbox.

41 only use Netflix

56 only use Redbox

23 only use a video store

18 use only a video store and Redbox

54 use only Netflix and Redbox

35 use only a video store and Netflix

13 use all three

33 use none of these

5.

A group of people were asked if they had run a red light in the last year. 178 responded "yes", and 309 responded "no".

Find the probability that if a person is chosen at random, they have run a red light in the last year.

6.

Giving a test to a group of students, the grades and gender are summarized below

	A	B	C	Total
Male	3	4	16	23
Female	11	14	5	30
Total	14	18	21	53

If one student was chosen at random, find the probability that the student was male.

7.

Giving a test to a group of students, the grades and gender are summarized below

	A	B	C	Total
Male	7	17	14	38
Female	9	10	11	30
Total	16	27	25	68

If one student is chosen at random, find the probability that the student was male AND got a "A".

8.

Kenneth buys a bag of cookies that contains 9 chocolate chip cookies, 4 peanut butter cookies, 6 sugar cookies and 5 oatmeal cookies.

What is the probability that Kenneth reaches in the bag and randomly selects a chocolate chip cookie from the bag, eats it, then reaches back in the bag and randomly selects a peanut butter cookie?

9.

Suppose a jar contains 18 red marbles and 21 blue marbles. If you reach in the jar and pull out 2 marbles at random at the same time, find the probability that both are red.

10.

A certain disease occurs in **4% of the population**. The *false negative rate is 30%* and the *false positive rate is 1%*. (On the test you will need to make the following table yourself)

Make a contingency table describing the situation:

	Tests positive	Tests negative	Row Totals
Has disease	= 70% of row total 2.8	= 30% of row total 1.2	4
Does not have disease	= 1% of row total 0.96	= 99% of row total 95.04	96
Column Totals	2.8 + 0.96 = 3.76	1.2 + 95.04 = 96.24	100

What is the probability that a person has the disease given that they test positive?

$\Pr(\text{has disease} \mid \text{tests positive}) = 2.8 \div 3.76 = 0.745$ which means 74.5% likelihood

11.

A company estimates that 15% of their products will fail after the original warranty period but within 2 years of the purchase, with a replacement cost of \$500.

If they offer a 2-year extended warranty for \$72, what is the company's expected value of each warranty sold?

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