UNHM MATH 422 Exam #3 NAME_____
Date_____

PLEASE REMEMBER: Show your reasoning and/or math work in every problem. Some questions have more than one part. Make sure you answer every part of the question that was asked. You are being asked to calculate some things and interpret others. A formula sheet is included separately. A calculator is helpful for this exam. There are ***11 problems*** worth ***5 points*** each:

1. Let S be the universal set, where:

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

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

Set $A = \{all\ numbers\ from\ 1\ to\ 10\}$

Set $B = \{even\ numbers\ from\ 2\ to\ 20\}$

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

Part B. LIST the elements in the set A^c :

Part C. LIST the elements in the set ($A \cap B^c$):

Part D. LIST the elements in the set $(A \cup B)^c$:

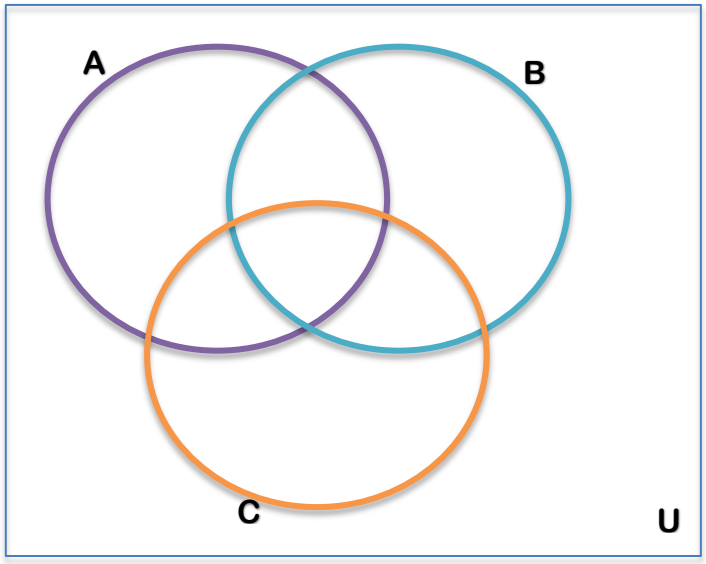
2. Let the Universal set U = {a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w,y}. Note that U has 24 elements so that $n(U) = 24$

Create subsets A, B, and C of the universal set U so that ***every 'space'*** in the Venn Diagram contains 3 elements of U. Place the elements in the Venn Diagram below:

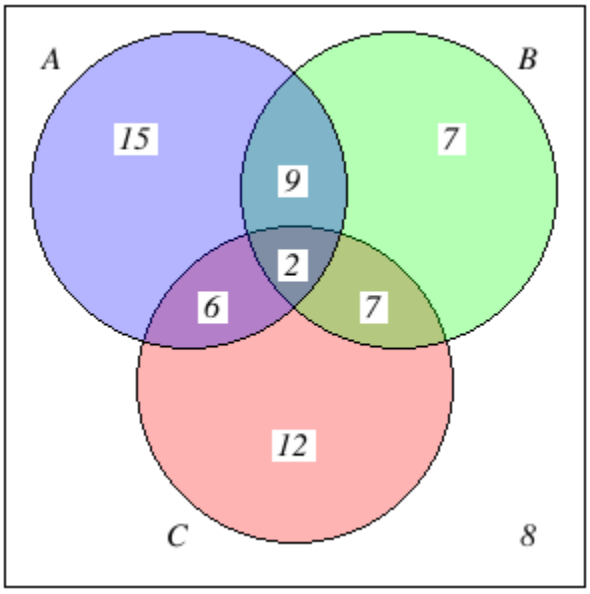
LIST the elements of A:

LIST the elements of B:

LIST the elements of C:



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



$n(B) =$

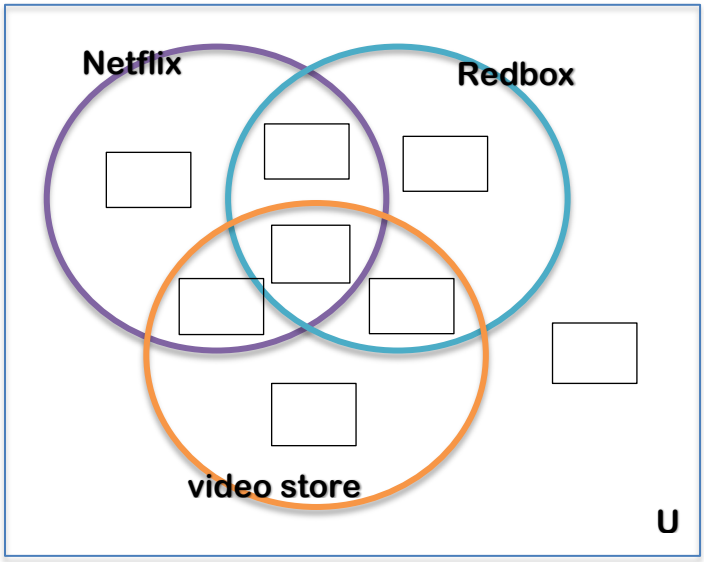
$n(B \cap C) =$

$n(A \cup B) =$

$n(A^c) =$

4. ***190 people were surveyed*** asking whether they watch movies at home from Netflix, Redbox, or a video store. Use the results to determine how many people use Redbox.

21 only use Netflix	***??*** only use Redbox
3 only use a video store	43 use only a video store and Redbox
32 use only Netflix and Redbox	11 use only a video store and Netflix
9 use all three	13 use none of these



A. Place numbers in the diagram

B. How many people only use Redbox?

C. How many people use Redbox in all?

5. A group of people were asked if they had run a red light in the last year. 241 responded "yes", and 318 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 class section are summarized below

	A	B	C	Total
Morning	9	11	18	38
Afternoon	12	15	5	32
Total	21	26	23	70

If one student was chosen at random, find the probability that the student was in the morning class.

7. Use the table from question #6 and answer the following question:

If one student is chosen at random, find the probability that the student was in the afternoon class AND got a "B":

8. Kenneth buys a bag of cookies that contains 8 chocolate chip cookies, 5 peanut butter cookies, 12 sugar cookies and 10 oatmeal cookies.

What is the probability that Kenneth reaches in the bag and randomly selects a chocolate chip cookie **OR** an oatmeal cookie?

9. Suppose a jar contains 21 red marbles and 18 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. At any one time, a certain disease occurs in **6% of the population**. A test for the disease is in use with the **false negative rate is 40%** and the false positive rate is 1%.

Part A: Make a contingency table describing the situation:

	Tests positive	Tests negative	Row Totals
Has disease			
Does not have disease			
Column Totals			**100**

Part B: What is the probability that a person has the disease ***given that*** they test positive?

Part C: What is the probability that a person has the disease ***given that*** they test negative?

11. A company estimates that ***9% of their products will fail*** after the original warranty period but within 2 years of the purchase, with a replacement cost of $450.

If they offer a 2-year extended warranty for $38, what is the company's expected value of each warranty sold? Let "x" be the profit or loss to the company for each extended warranty sold.

Part A: Complete the following probability distribution:

x	Explanation:	Pr(x)	$x \cdot \Pr(x)$

Part B: What is the "Expected Value" in this situation?

Part C: If they adjusted the warranty price to $41, how much does the expected value change?