Math 114 Name: _____

Sample Exam I – Chapter 7 Date: _____

1. List the elements in the set {x|x is a multiple of 5 greater than 0 but less than 30}

2. Express the set {3,6,9,12,15,18,21,24} in set builder notation.

3. List the elements in the set {$x$|$x$ is a positive even integer less than 21}

4. Express in set builder notation the set {1,2,3,4,5}

5. How many subsets does the set {a,j,b,d,f} have?

6. List all the subsets of the set {c,a,t}.

7. Let U = {1,2,3,4,5,6,7,8,9,10}, A = {1,2,3,7,8}, B={2,4,6,8,10}, and C = {3,6,10} define the following sets:

   a) $A'$

   b) $B'$

   c) $C'$

   d) $B \cup C$

   e) $A \cap B$

   f) $A' \cap B'$

   g) $(A \cap B)'$

   h) $(A \cup C) \cap B$

   i) $A \cap (B \cup C)$

j) $(A \cap B) \cup C$

k) $A \cap B \cap C'$

l) $(A \cap C)' \cap B$

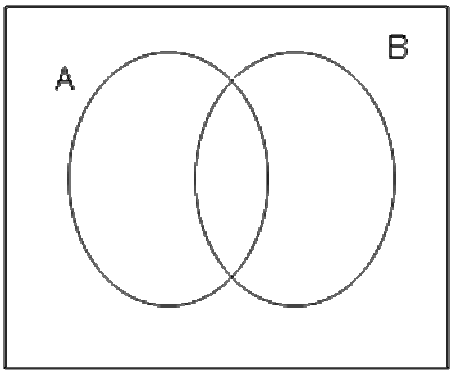
m) n( $A \cap B$ )

n) n(U)

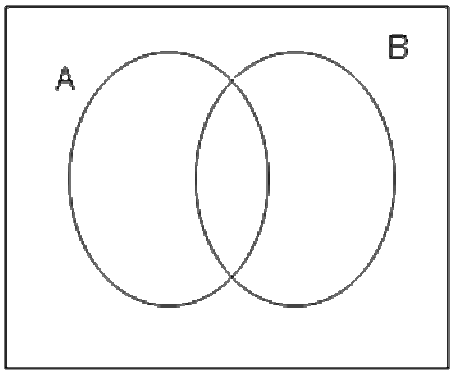
o) n( $(A \cap B) \cup C$ )

8. Shade a Venn Diagram to represent the following sets:

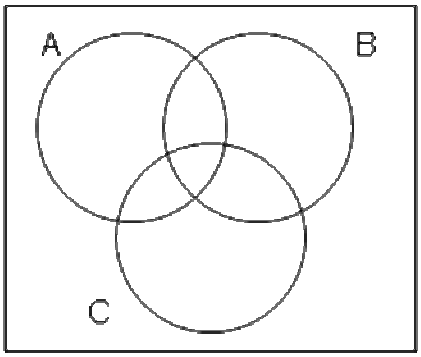
a) $A'$



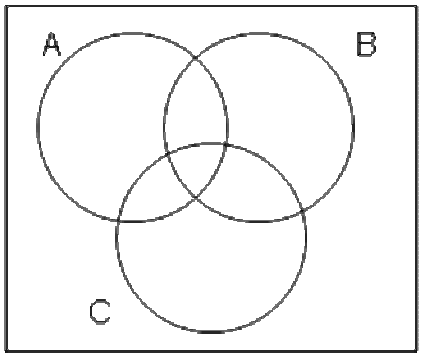

b.) $(A \cap B)'$



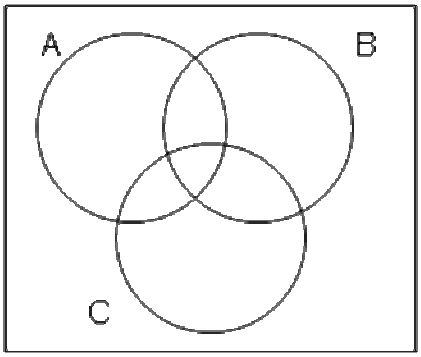
c) $A \cap B \cap C$



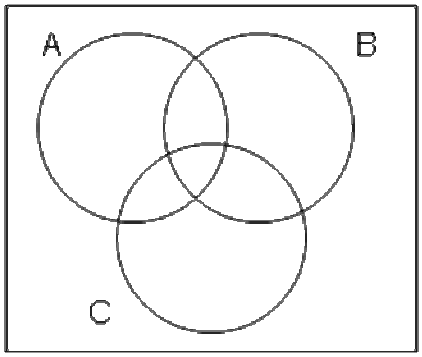

d) $A' \cap (B \cup C)$




e) $(B' \cap C') \cup A$

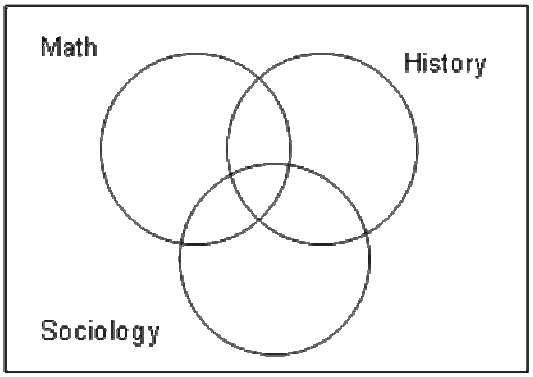



f) $(C \cup A) \cap B$



9.) In a class of 200 students, 120 are taking History, 110 are taking Yogurt Testing II, and 80 are taking both. How many students are taking at least one of the classes? How many are not taking either of the classes?

10.) In a class of 200, 75 take mathematics, 70 take history, 75 take sociology, 35 take mathematics and sociology, 20 take history and sociology, 25 take mathematics and history, and 15 take all three.




a. How many take at least one of the three subjects?

b. How many take exactly one of the three subjects?

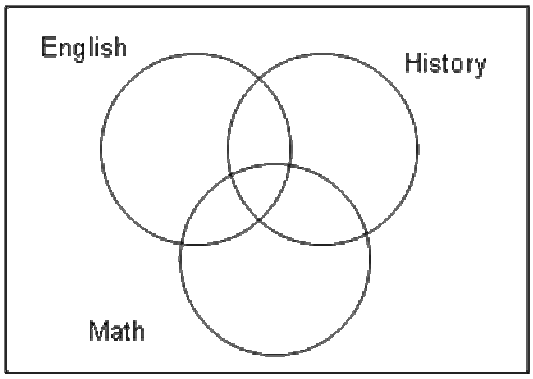
c. How many take history or mathematics but not sociology?

d. How many do not take exactly two of the three subjects?

e. How many do not take either history or mathematics?

11.) A survey of 100 students at Cabrini showed the following:

44 take English
53 take History
50 take Math
18 take English and Math
22 take English and History
25 take History and Math
10 take all three




a) Do not take any of these subjects?

b) How many only take Math?

c) How many take History or English?

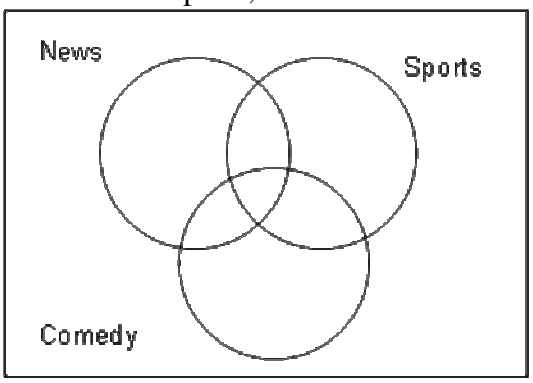
d) How many take History or English but not Math?

e) How many take exactly one of these subjects?

f) How many take exactly 2 of these subjects?

g) How many take at least two of these subjects?

12.) In a survey of 250 television viewers, 95 like to watch news, 125 like to watch sports, 125 like to watch comedy, 25 like to watch news and comedy, 45 like to watch sports and comedy, 35 like to watch news and sports, and 5 like to watch all three.




a. How many like to watch news but not sports?

b. How many like to watch news or sports but not comedy?

c. How many do not like to watch either news or sports?

d. How many do not watch sports only?

e. How many watch sports and comedy but not the news?

13.) This table lists the population of a city by race and gender. Use this information and the letters given to find the number of people in each set.

| | White ($W$) | Black ($B$) | American Indian ($I$) | Asian ($A$) |
|---|---|---|---|---|
| Female ($F$) | 754,343 | 67,578 | 185 | 28,711 |
| Male ($M$) | 689,467 | 89,356 | 358 | 34,684 |

a. $F$

b. $F \cap (I \cup A)$

c. $M \cup B$

d. $W' \cup I' \cup A'$

14.) Define the sample space for a flipping a coin and then tossing a die.
_____.

15.) If you roll a pair of dice what is the size of this sample space _____

16.) A box contains 3 red, 5 purple, 4 orange, and 8 black marbles. If you pick one marble from the box, what is the probability that you

a. Pick a black marble? _____

b. Pick a purple OR red marble? _____

c. Don't pick an orange marble? _____

17.) A pair of dice is rolled once. Find the following probabilities for the sum of the dice:

a. P(sum of 6) _____

b. P(sum of 9) _____

c. P(sum of 6 OR 9) _____

d. P(sum is a multiple of two) _____

e. P(sum is a multiple of two OR GREATER than 9) _____

18.) Determine if the following probabilities are valid for an event. If NOT VALID - TELL ME WHY!

a. P(1) = .2 P(2) = .5 P(3) = .2 _____

b. P(1) = .75 P(2) = -.3 P(3) = .55 _____

c. P(1) = .30 P(2) = .50 P(3) = .20 _____

19.) Sam is taking courses in Physical Chemistry and Deformable Bodies. He estimates he has a 65% chance of passing Physical Chemistry and a 75% chance of passing Deformable Bodies. He also estimates he has a 40% chance of passing both courses. Use a Venn Diagram to figure out what the probability is that Sam passes ONLY Deformable Bodies.

_____

20.) Let E and F be events of a sample space S and let P(E) =.60, P(F) = .80, and $P(E \cap F)$ = .5. Find the probabilities of the following events (Hint use a Venn Diagram!)

a. P(E or F)= _____

b. P(F but not E) = _____

c. P(neither E nor F) = _____

d. Are events E and F mutually exclusive?

Why or why not? _____

21.) Given P(E)=.65, P(F) = .75, and $P(E \cup F)$ = .90 find:

a. $P(E \cap F)$ = _____

b. P(E|F) = _____

c. $P(E' \mid F)$ = _____

22.) If E and F are **independent events** with P(E) = .40 and P(F) = .70 find,

a. P(E|F) = _____

b. P(F|E) = _____

c. $P(E \cap F)$ = _____

23.) A total of 500 people were asked what is their primary news source. The answers are given in the following table.

| | Newspaper | Radio | Television | Totals |
|---|---|---|---|---|
| Female | 50 | 100 | 150 | 300 |
| Male | 25 | 80 | 95 | 200 |
| Totals | 75 | 180 | 245 | 500 |

a. What is the probability a random person surveyed says their primary news source is the radio? _____

b. What is the probability a random person surveyed is a female, GIVEN that their primary news source is the television? _____

c. What is the probability that a random person surveyed says their primary news source is the radio, GIVEN that the person is a male? _____

24.) At a certain university 63% of the students are women. A study reveals that 24% of the women regularly play video games and 72% of the men regularly play video games. Find the probability that a randomly selected student at this university is a regular video game player. (HINT: Use a tree diagram)

**<u>Equations to Use:</u>**

**Union Rule -** $P(E \cup F) = P(E) + P(F) - P(E \cap F)$

**Conditional Probability Equations:**

$$P(E|F) = \frac{P(E \cap F)}{P(F)}$$

$$P(F|E) = \frac{P(E \cap F)}{P(E)}$$

$$P(E \cap F) = P(F) \times P(E|F)$$

**Independent Events –**

$$P(E|F) = P(E)$$

$$P(F|E) = P(F)$$

$$P(E \cap F) = P(E) * P(F)$$

**Rolling a Pair of Dice**:

| Possible Sums | Number of Ways to get that Sum |
|---|---|
| 2 | 1 |
| 3 | 2 |
| 4 | 3 |
| 5 | 4 |
| 6 | 5 |
| 7 | 6 |
| 8 | 5 |
| 9 | 4 |
| 10 | 3 |
| 11 | 2 |
| 12 | 1 |