

MAT 111 – Practice Chapter 2 Test

1. Express the set using set – builder notation

{spring, summer, winter, fall}

{x | x is a season of the year}

2. Express the set using the roster method

The set of months of the year that start with the letter J

J = {January, June, July}

3. Find the cardinal number for set A. Set A = {Cabrini College, Villanova University, Eastern College, Rosemont College, Immaculata University}

The cardinality of A = 5

4. Are these sets equal? Give a reason for your answer.

{a, b, c, d, e} {a, b, b, c, c, c, d, d, d, d, e, e, e, e, e}

Yes. All elements are present.

5. Are these sets equivalent? Give a reason for your answer.

{a, b, c, d, e} {a, a, a, a, a, b, b, b, b, c, c, c, d, d, e}

Yes; they have the same number of distinct elements.

Let U = {a, b, c, d, e} A = {b, c, d} B = {c, d, f}

6. Use the roster method to write A'

A' = {a, e}

7. Is A an improper subset of U? Give a reason for your answer.

No, A is not an improper subset of U. All the elements in A are in U, but not the only elements of U.

8. Is B a subset of U? Give a reason for your answer.

No, B is not a subset of U. f is NOT an element of U.

9. List all the subsets of A.

{b}, {c}, {d}, {b, c}, {b, d}, {c, d}, {b, c, d}, \emptyset

*to check that you have all of the subsets, remember that the number of subsets is equal to 2^n where n = number of elements in the set.

$2^3 = 8$ and we have 8 listed.

10. If a set has 63 proper subsets, how many elements are there in the set?

63 proper subsets + 1 improper subset = 64 subsets. $2^n = 64$ n = 4

There are 4 elements in the set.

Let $U = \{ @, \#, \$, \%, \wedge, *, ! \}$

Let $A = \{ @, \$, \wedge, ! \}$

Let $B = \{ \%, \wedge, * \}$

Let $C = \{ @, ! \}$

Find each of the following sets:

11. $A \cap C'$

$$C' = \{ \#, \$, \%, \wedge, * \}$$

$$A \cap C' = \{ \$, \wedge \}$$

12. $B' \cup C$

$$B' = \{ @, \#, \$, ! \}$$

$$B' \cup C = \{ @, \#, \$, ! \}$$

13. $(A \cap C)'$

$$A \cap C = \{ @, ! \}$$

$$(A \cap C)' = \{ \#, \$, \%, \wedge, * \}$$

14. $(A \cup B)'$

$$A \cup B = \{ @, \$, \%, \wedge, *, ! \}$$

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

15. $A \cap U$

$$A \cap U = \{ @, \$, \wedge, ! \}$$

16. $A \cup (B \cap C)$

$$B \cap C = \emptyset$$

$$A \cup (B \cap C) = \{ @, \$, \wedge, ! \}$$

17. $A' \cup (B' \cap C)$

$$B' = \{ @, \#, \$, ! \}$$

$$B' \cap C = \{ @, ! \}$$

$$A' = \{ \#, \%, * \}$$

$$A' \cup (B' \cap C) = \{ @, \#, \%, *, ! \}$$

18. $(A \cup B) \cap (A \cup C)$

$$A \cup B = \{ @, \$, \%, \wedge, *, ! \}$$

$$A \cup C = \{ @, \$, \wedge, ! \}$$

$$(A \cup B) \cap (A \cup C) = \{ @, \$, \wedge, ! \}$$

19. $(B \cup C)' \cap A$

$$B \cup C = \{ @, \%, \wedge, *, ! \}$$

$$(B \cup C)' = \{ \#, \$ \}$$

$$(B \cup C)' \cap A = \{ \$ \}$$

20. $(A \cup B \cup C)'$

$$A \cup B \cup C = \{ @, \$, \%, \wedge, *, ! \}$$

$$(A \cup B \cup C)' = \{ \# \}$$

21. An activities director for a cruise ship has surveyed 240 passengers. Of the 240 passengers:

135 like swimming

150 like dancing

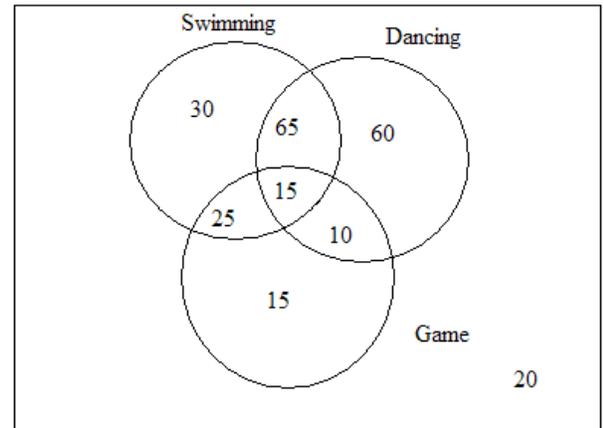
65 like games

80 like swimming and dancing

40 like swimming and games

25 like dancing and games

15 like all three activities



How many passengers:

a. Like exactly two of the three activities:

$$65 + 25 + 10 = 100$$

b. Like only swimming:

$$30$$

c. Like none of the activities:

$$20$$

22. Draw a Venn Diagram and shade the region(s) that represent $A \cup (B \cap C)$

First, label your regions

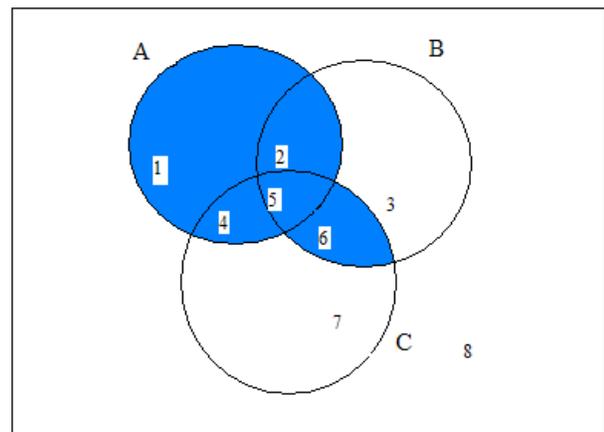
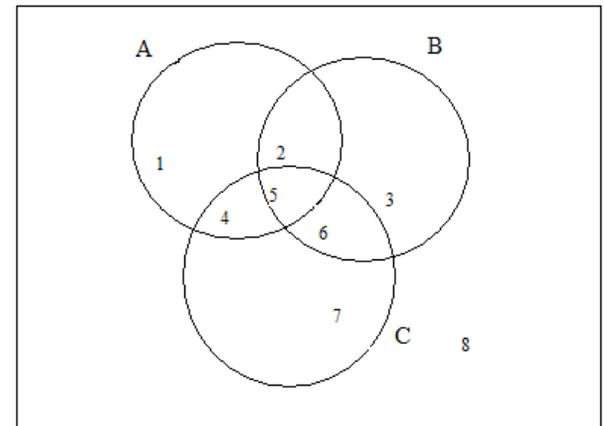
B: 2, 3, 5, 6

C: 4, 5, 6, 7

$(B \cap C)$: 5, 6

A: 1, 2, 4, 5

$A \cup (B \cap C)$: 1, 2, 4, 5, 6



23. Give an example of an empty set

Answers will vary. As long as the conditions are impossible, your answer should be correct. Ex.

Women who play on the Eagles, Men who have given birth

24. Give an example of a set with 7 proper subsets.

7 proper subsets + 1 improper subset = 8 subsets.

Answers will vary. As long as set has 3 elements, your set should be correct.