

## CIS7 Unit 3 In-Class Assignment: Using Sets (Chapter 7)

In this assignment, we will work with sets, set notation, operations and diagrams. Complete the following exercises. Refer to the below table if you need to Copy-Paste Symbol:

Symbols:

$\in$	ELEMENT OF	$\subset$	SUBSET OF
$\notin$	NOT AN ELEMENT	$\subseteq$	SUBSET OF OR EQUAL TO
$\emptyset$	EMPTY SET	$\cup$	UNION
$\cap$	N-ARY INTERSECTION	$\complement$	COMPLEMENT
$\Delta$	SYMMETRIC DIFFERENCE		

1. Denote A as an element of B.

$$A \in B$$

2. Denote V as an element of T

$$V \in T$$

3. Denote the cardinality for  $P = \{4, 9, 24, 60, 105\}$

$$|P| = 5$$

4. Denote the cardinality for  $Q = \{1, 16, 28, 67, 90, 111, 134, 254, 314\}$

$$|Q| = 9$$

5. How do you denote an empty set F?

$$F \emptyset \quad \text{Not init, so no val/equal sign}$$

6. Determine if X is equal to Y, when  $X = \{11, 99, 44, 33, 77\}$  and  $Y = \{99, 77, 33, 44, 11\}$ . Explain your answer.

Same size, same elements,  
therefor  $X=Y$ .

7. Determine if A is equal to B and C, when  $A = \{-2, 55, 23, 91, 67, 82, 10\}$ ,  $B = \{67, -2, 82, 55, 10, 91\}$ ,  $C = \{23, 91, 10, -2, 67, 4, 55\}$ . Explain your answer.

Some sets are missing/have different elements;  
Also, different size; therefor  $A \neq B \neq C$ .

8. Provide the set-builder notation for the following.

- a. The set of R in T such that  $|R|$  is greater than 7, which is equal to  $\{3, 7, 10, 14, 17\}$ .

$$\{R \in T \mid R > 7\} \quad R = \{10, 14, 17, \dots\}$$

- b. The set of integers such that  $Y^3 > 7 = \{4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16\}$

$$\{Y \in \mathbb{Z} \mid Y^3 > 7\} \quad Y = \{4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16\}$$

- c. The set of natural numbers such that  $Y^2 < 100 = \{3, 4, 5, 6, 7, 8, 9\}$

$$\{Y \in \mathbb{N} \mid Y^2 < 100\} \quad Y = \{3, 4, 5, 6, 7, 8, 9\}$$

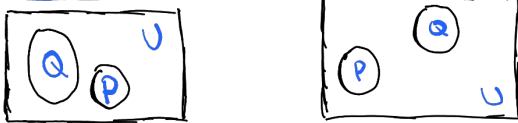
$$4^3 > 7 \checkmark$$

$$9^2 < 100 \checkmark$$

- d. The set of  $S$  such that  $S=9Y$  where  $Y$  is a natural number =  $\{1,3,5,7,9,\dots\}$  = positive odd integer.

$$\{Y \in \mathbb{N} \mid S = 9Y\}, Y = \{1, 3, 5, 7, 9, \dots\}$$

9. Draw a Venn diagram that contains 2 two disjoint sets  $P$  and  $Q$  with elements from the universe  $U$ .



10. Determine if the following statements about Venn diagram is True or False:

- A. If  $R$  is a subset of  $S$ ,  $R$  is included in  $S$  or  $S$  includes  $R$ . Then, every element of  $R$  is also an element of  $S$ .

True

- B. Every element of  $G$  is an element of  $H$  but there is at least one element of  $H$  that is not an element of  $G$ . We conclude  $G$  is not a proper subset of  $H$ .

$$G = \{13, 14, 15\} \in H = \{13, 14, 15, 16\} \text{ False}$$

- C. If  $X$  is a subset of  $Y$  but  $X$  is not equal to  $Y$ .

$$X = \{1, 2, 3\} \in Y = \{1, 2, 3\} \text{ True}$$

11. For  $X = \{10, 20, 30, 40, 50\}$ ,  $Y = \{30, 40, 50, 60, 70\}$ ,  $Z = \{10, 50, 100, 200\}$ , Complete the following set operations:

- A.  $X \cup Y$

$$= \{10, 20, 30, 40, 50, 60, 70\}$$

- B.  $X \cup Z$

$$= \{10, 20, 30, 40, 50, 100, 200\}$$

- C.  $Y \cup Z$

$$= \{10, 30, 40, 50, 60, 70, 100, 200\}$$

12. For  $R = \{5, 10, 15, 20, 60\}$ ,  $S = \{10, 15, 25, 35\}$ ,  $T = \{15, 25, 35, 45, 60\}$ , determine the result for the following operations:

- A.  $R \cap S$

$$= \{10, 15\}$$

- B.  $S \cap T$

$$= \{15, 25, 35\}$$

- C.  $R \cap T$

$$= \{15, 60\}$$

13. Find the complement for  $X, Y, Z$

For

$$X = \{20, 30, 40, 45\},$$

$$Y = \{25, 30, 40, 50, 55, 60\},$$

$$Z = \{30, 35, 50, 55, 65\}$$

$$U = \{10, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80\}$$

$$X^c = \{10, 25, 35, 50, 55, 60, 65, 70, 75, 80\}$$

$$Y^c = \{10, 20, 35, 45, 65, 70, 75, 80\}$$

$$Z^c = \{10, 20, 25, 40, 45, 60, 70, 75, 80\}$$

14. Given  $A = \{2, 4, 6, 8, 10\}$ ,  $B = \{4, 5, 6, 7, 8\}$ ,  $C = \{1, 3, 5, 6, 7, 8, 9, 11\}$ , determine the difference for the following:

A.  $A - B = \{2, 10\}$

B.  $B - C = \{4\}$

C.  $A - C = \{2, 4, 10\}$

15. Given  $D = \{1, 3, 5, 6, 7, 9, 11\}$ ,  $E = \{2, 4, 6, 7, 10\}$ ,  $F = \{3, 4, 7, 12\}$ , determine the symmetric difference for the following:

A.  $D \Delta E = \{1, 2, 3, 4, 5, 9, 10, 11\}$

B.  $E \Delta F = \{2, 3, 6, 10, 12\}$

C.  $D \Delta F = \{1, 4, 5, 6, 9, 11, 12\}$

16. Find the  $P(S)$ , given  $S = \{2, 3, 4\}$ .

$\{\emptyset\}$

$\{2\}, \{3\}, \{4\}$

$\{2, 3\}, \{2, 4\}, \{3, 4\}$

$\{2, 3, 4\}$

$\mathcal{P} = \text{elements}$

17. Given  $T = \{2, 4\}$ ,  $U = \{6, 8\}$ ,  $W = \{1, 3\}$ , determine the Cartesian product for  $T \times U \times W$ .

For example:

$T \times U \times W = \{(2, 6, 1), (2, 6, 3), (2, 8, 1), (2, 8, 3), (4, 6, 1), (4, 6, 3), (4, 8, 1), (4, 8, 3)\}$

All size 1024;  $2 \cdot 2 \cdot 2 = 8$ ;  $|T| \cdot |U| \cdot |W| = 8$

18. Given  $U = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$ , determine the binary representation for the following:

A.  $A = \{2, 3, 5, 9\} = 0011010001$

B.  $B = \{1, 4, 6, 8\} = 0100101000$

C.  $C = \{0, 5, 7, 9\} = 1000010100$