Solutions to Section 1.2
The Language of Sets

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1 Exercise Set 1.2

1. A and C are equal.

2.

a. The set of all elements x in the set of positive real numbers such that x is greater than 0 and less than 1.

b. The set of all elements x in the set of real numbers such that x is less than or equal to 0 or x is greater than or equal to 1.

c. The set of all elements n in the set of integers such that n is a factor of 6.

d. The set of all elements n in the set of positive integers such that n is a factor of 6.

3.

a. No

b. 3

c. 3

4.

a. Yes

b. 1

c. 2

d. Yes

e. No

5. A and D are equal

6. 6 Elements. $T_2 = \{2, 4\}$, $T_{-3} = \{-3, 9\}$, $T_1 = \{1\}$, $T_0 = \{0\}$

7.

a. -1,1

b. 0,2

c. No elements

d. $\mathbb{Z}$

e. No elements

f. $\mathbb{Z}$

8.

a. No, because j is not in A.

b. Yes, because every element in C is in A.

c. Yes, because every element in C is in C.

d. Yes, because all elements in C are within A, but there are two more elements within A.

9.

a. Yes

b. No

c. No

d. Yes

e. Yes

f. No

g. Yes

h. No

i. Yes

j. Yes

10.

a. No

b. No

    c. Yes

    d. Yes

11.

    a. 8 elements: $A \times B = (w, a), (w, b), (x, a), (x, b), (y, a), (y, b), (z, a), (z, b)$

    b. 8 elements: $B \times A = (a, w), (a, x), (a, y), (a, z), (b, w), (b, x), (b, y), (b, z)$

    c. 16 elements:
    $A \times A = \{(w, w), (w, x), (w, y), (w, z),$
    $(x, w), (x, x), (x, y), (x, z),$
    $(y, w), (y, x), (y, y), (y, z),$
    $(z, w), (z, x), (z, y), (z, z)\}$

    d. 4 elements: $B \times B = (a, a), (a, b), (b, a), (b, b)$

12.

    a. 9 elements: $\{(2, 1), (2, 3), (2, 5), (4, 1), (4, 3), (4, 5), (6, 1), (6, 3), (6, 5)\}$

    b. 9 elements: $\{(1, 2), (1, 4), (1, 6), (3, 2), (3, 4), (3, 6), (5, 2), (5, 4), (5, 6)\}$

    c. 9 elements: $\{(2, 2), (2, 4), (2, 6), (4, 2), (4, 4), (4, 6), (6, 2), (6, 4), (6, 6)\}$

    d. 9 elements: $\{(1, 1), (1, 3), (1, 5), (3, 1), (3, 3), (3, 5), (5, 1), (5, 3), (5, 5)\}$

13.

    a. $\{(1, (u, m)), (1, (u, n)), (2, (u, m)), (2, (u, n)), (3, (u, m)), (3, (u, n))\}$

    b. $\{((1, u), m), ((1, u), n), ((2, u), m), ((2, u), n), ((3, u), m), ((3, u), n)\}$

    c. $\{(1, u, m), (1, u, n), (2, u, m), (2, u, n), (3, u, m), (3, u, n)\}$

14.

    a. $\{(a, (x, p)), (a, (x, q)), (a, (x, r)), (a, (y, p)), (a, (y, q)), (a, (y, r))\}$

    b. $\{((a, x), p), ((a, y), p), ((a, x), q), ((a, y), q), ((a, x), r), ((a, y), r)\}$

    c. $\{(a, x, p), (a, y, p), (a, x, q), (a, y, q), (a, x, r), (a, y, r)\}$

15. $0000, 0001, 0010, 0100, 1000$

16. xxxxy,xxxyx,xxyxx,xyxxx,yxxxx