Tutorial → 1 Soln

(1) b & d are correct.

(2) b, c, d are correct & $\{0\}$ is the answer.

(3) a → $\{-1, 1\}$
b → $\{1, 2, \ldots, 11\}$
c → $\{1, 4, 9, 16, \ldots, 81\}$
d → $\{\ \}$

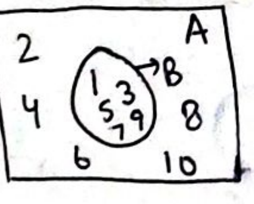
(4) (a) → If set of airline flights from New York to New Delhi is A and set of nonshop airline flights from New York to New Delhi is B, then
$B \subset A$

(b) → Similarly here neither A is subset of B, nor B is subset of A.

(c) → $A \subset B$

(5) a & c are correct.

(6)



A → set of all positive integers not exceeding 10.
B → subset of A containing odd integers.

(7) only in (a) pairs of sets are equal.
<u>Note</u> → ϕ & $\{\phi\}$ are different.

(8) a, b, d, e are true, rest are false.

(9) $A = \{2, 3\}$, $B = \{2, 3, 4, \{2, 3\}\}$

(10) $A \times B = \{(a,y), (a,z), (b,y), (b,z), (c,y), (c,z), (d,y), (d,z)\}$
$B \times A = \{(y,a), (z,a), (y,b), (z,b), (y,c), (z,c), (y,d), (z,d)\}$

(11) Answer is 2^{2n}. (d).

Sol^n → We know that total number of subsets of a set (A) of cardinality $(2n+1)$ are 2^{2n+1}.

Number of subsets of A having 0 cardinality $= {}^{2n+1}C_0$

" " " 1 " $= {}^{2n+1}C_1$

" " " 2 " $= {}^{2n+1}C_2$

— — — — — — — — — — —

" " " $2n$ " $= {}^{2n+1}C_{2n}$

" " " $2n+1$ " $= {}^{2n+1}C_{2n+1}$

So, $\displaystyle {}^{2n+1}C_0 + {}^{2n+1}C_1 + \dots + {}^{2n+1}C_n + \underbrace{{}^{2n+1}C_{n+1} + \dots + {}^{2n+1}C_{2n+1}}_{\text{These are the subsets of cardinatity more than } n \text{, so let it is } \alpha.} = 2^{2n+1}$

$\Rightarrow {}^{2n+1}C_0 + {}^{2n+1}C_1 + \dots + {}^{2n+1}C_n + \alpha = 2^{2n+1}$

$\Rightarrow \underbrace{{}^{2n+1}C_{2n+1} + {}^{2n+1}C_{2n} + \dots + {}^{2n+1}C_{n+1}}_{\alpha} + \alpha = 2^{2n+1}$ (using ${}^{n}C_r = {}^{n}C_{n-r}$)

So $\alpha + \alpha = 2^{2n+1} \Rightarrow 2\alpha = 2^{2n+1}$

$\Rightarrow \alpha = 2^{2n}$

(12) $A \cap B = 10$

We require $|(A \times B) \cap (B \times A)|$

As, we know

$$(A \times B) \cap (B \times A) = (A \cap B) \times (B \cap A)$$

so $|(A \times B) \cap (B \times A)| = 10 \times 10 = 100$.

(13) $n(D) = 36$, $n(A) = 12$, $n(S) = 18$

$n(A \cup D \cup S) = 45$, $n(A \cap D \cap S) = 4$

$n(A \cap D) + n(A \cap S) + n(D \cap S) = ?$

As we know

$$n(A \cup D \cup S) = n(A) + n(D) + n(S) - n(A \cap D) - n(A \cap S) - n(D \cap S) + n(A \cap D \cap S)$$

Put the values & get the answer. <u>Answer</u> 25.

(14) chess $\to A$, carrom $\to B$, scrabble $\to C$

$n(A \cup B \cup C) = 40$, $n(A) = 18$, $n(B) = 20$, $n(C) = 27$,

$n(A \cap C) = 7$, $n(B \cap C) = 12$, $n(A \cap B \cap C) = 4$

i) $n(A \cap B) = ?$ $\to$ Ans $= 10$

ii) $n(A \cup B) - n(A \cap B \cap C) = ?$

for i), use the above formula

for ii) $n(A \cup B) - n(A \cap B \cap C)$

$= n(A) + n(B) - n(A \cap B) - n(A \cap B \cap C)$

$= 18 + 20 -$ value obtained in i) $- 4$

$= 18 + 20 - 10 - 4$

$= 24$

(15) $A \to$ odd set

$B \to$ square of an integer, then

$n(A) = 50$

$n(B) = 10$, $n(A \cap B) = 5$

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$

so $n(A \cup B) = 50 + 10 - 5$

$= 55$

<u>Answer</u>