DMPT

Assignment Solutions

1. A: Set of integers divisible by 2

B: divisible by 3

C: divisible by 7.

$|A| = \left[\frac{250}{2}\right] = 125$

$|B| = \left[\frac{250}{3}\right] = 83$

$|C| = \left[\frac{250}{7}\right] = 35$

$|A \cap B|$: divisible by 2 and 3 i.e divisible by 6

$|A \cap B| = \left[\frac{250}{6}\right] = 41$

$|A \cap C|$ = divisible by 2 and 7 i.e by 14

$= \left[\frac{250}{14}\right] = 17$

$|B \cap C| = \left[\frac{250}{21}\right]$ divisible by 3 and 7 i.e by 21

$= 11$

$|A \cap B \cap C|$ = divisible by 2, 3, 7 i.e 42

$\left[\frac{250}{42}\right] = 5$

By inclusive exclusive principle

$|A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |A \cap C| - |B \cap C| + |A \cap B \cap C|$

$= 125 + 83 + 35 - 41 - 17 - 11 + 5$

$= \underline{179}$

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(2) (a) atleast 8 characters but not more than 12 $= P_8 + P_9 + P_{10} + P_{11} + P_{12}$

Password can be → lower case (or) Upper case (or) digit (or) special char
e.g. letters e.g. letters

$= 26 + 26 + 10 + 6$

$= 68$ → Total 68 characters are available

P_8 → _ _ _ _ _ _ _ _
68 68 68 68 ... 68 → repetition is allowed order matters

$(68)^8$

$P_8 + P_9 + P_{10} + P_{11} + P_{12}$

$= 68^8 + 68^9 + 68^{10} + 68^{11} + 68^{12}$

$= 9920671339261.\ldots^{21} = 9.920671339 \times 10^{21}$

$\approx 9.9 \times 10^{21}$

(b) No. of ways to have one occurence of atleast of the special characters

= Total permutation − No of ways of occurence of no special characters

$P_8 = 68^8 - 62^8$

$P_9 = 68^9 - 62^9$

$P_{10} = 68^{10} - 62^{10}$

$P_{11} = 68^{11} - 62^{11}$

$P_{12} = 68^{12} - 62^{10}$

$\Rightarrow P = P_8 + P_9 + P_{10} + P_{11} + P_{12}$

$= 6.641514496 \times 10^{21}$

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3) (a) Answer – 22 (use tree diagram)

(b) $4 \times 3 + 5 \times 2 = 22$

) (a) By Pigeon hole principle,

He has to take out 3 socks to be sure that he has atleast two socks of same color.

(b) 14

(5) By pigeon hole principle

$\left\lceil \frac{61327}{30} \right\rceil = 2045$. One dictionary should have atleast 2045 pages.

(6) (a) 150

(b) 25

(c) 6

(d) 2

(7) 9

(8) $^{20+5-1}C_{20} = {}^{24}C_{20}$ (or) ${}^{24}C_{4}$

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(9) 5 Cards to 6 players deck of 48

1 $48C_5$

2 $43C_5$

3 $38C_5$

4 $33C_5$

5 $28C_5$

6 $23C_5$

group of each

Remaining 18

$$\frac{48!}{(5!)^6 \times 18!}$$ permutations with indistinguishable objects

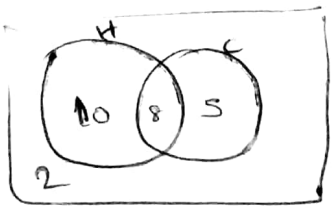
(or) $48C_5 \times 43C_5 \times 38C_5 \times 33C_5 \times 28C_5 \times 23C_5$

(10) Indistinguishable objects to distinguishable bins

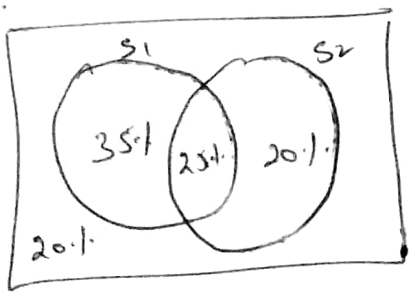
In Combination with repetition

$$8+10-1C_{10} = 17C_{10} \text{ (or) } 17C_7$$

(11) (a) 8



(b) 20%



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