:- Assignment 02 :-

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BS(CS) - 3A
Probability and statistics

Question # 01:-

a): A'

The Compliment of A is $A' = \{$nitrogen, potassium, uranium, oxygen$\}$.

b) $A \cup C$

The union of A and B is $A \cup B =$

{ copper, sodium, zinc, nitrogen, potassium

c) $(A \cap B') \cup C$

first we would find compliment of B ie B'

$B' = \{$ copper, uranium, oxygen, zinc$\}$

The intersection of A and B' ie $A \cap B'$

$A \cap B' = \{copper, zinc\}$.

Now $(A \cap B') \cup C = \{copper, zinc, oxygen\}$.

d): $B' \cap C'$:

$B' = \{copper, uranium, oxygen, zinc\}$

$C' = \{copper, sodium, nitrogen, potassium, uranium, zinc\}$

$B' \cap C' = \{copper, uranium, zinc\}$.

e): $A \cap B \cap C$

for A intersection B i.e $A \cap B = \{sodium\}$.

Now:

$A \cap B \cap C = \{\}$ (empty set)

F): $(A' \cup B') \cap (A' \cap C)$:

$A' = \{nitrogen, potamium, uraniam, oxygen\}$

$B' = \{copper, Uranium, Oxygen, zinc\}$

$A' \cup B' = \{uranium, oxygen\}$

Now for $A' \cap C$:

$A' \cap C = \{ \text{oxygen} \}$.

$(A' \cup B') \cap (A' \cap C) = \{ \text{oxygen} \}$ Ans.

Question # 02:

solution,

we have 8 options for blood type clamification, i.e AB+, AB-, A-, B+, B-, O+, O-

And 3 option for pressure:

for total number of ways of clamification. we have:

$$^{n}C_r = \frac{n!}{r!(n-r)!}$$

Here $n = 8$

$r = 3$

$$= \frac{8!}{3!(8-3)!} = \frac{40320}{6(5)!} = \frac{40320}{6(120)}$$

$= 56$ Ans

Question # 03:

solution

In a true_false Question, there are two pomible answers for each question ie true or false.

Hence for 9 Questions, the pomible answer would be.

$(2)^9$

$= 512$

Also, the events are independent, (the answer of one question doesn't effect the other one)

Question # 04:

a) To form a three-digit number out of 7 digits (0,1,2,3,4,5,6) without repitition. We would use formula:

$$^nC_r = \frac{n!}{r!(n-r)!}$$

$$^{7}C_3 = \frac{7!}{3!(7-3)!} = \frac{7\times6\times5\times4!}{3!(4)!} = 35$$

so, there are 35 different ways that three digits numbers can be formed using 0,1,2,3,4,5,6 without repitition.

b): for a number to be odd, the digits at unit should be 1, 3 or 5. since the digits cannot repeat.

i): Ending with 1: we would choose two digits out of 6 remaining (excluding 1).

$$^{6}C_2 = \frac{6!}{2!(6-2)!} = \frac{6\times5\times4!}{2!(4)!} = 15$$

ii) Ending with 3: similar, we choose two digit out of 6 (excluding 3) so possibilities are 15

iii) Ending with 5: it would be same i.e 15

Now adding these

15 (ending with 1) + 15 (ending with 3) + 15 (ending with 5)

$= 45$

c): greater than 330:

for greater than 330 must start with either 4, 5, or 6 (3 is maximum allowed).

i) starting with 4:

for remaining two digits (except hundreds) choose two digit out of remaining 6 excluding 4.

$$^6C_2 = \frac{6!}{2!(6-2)!} = 15$$

ii): starting with 5, similarly we choose two digits out of remaining 6 (excluding 5) so possibility is 15

iii): starting with 6: Choose two digits out of 6 excluding 6, we have 15 possibilities

15 (start with 4) + 15 (start with 5) + 15 (start with 6)

= 45 possibilities

so there are 45 three digit numbers greater than 330 that can be formed using given digits with out repetition.

Question # 05:-

a): probability that letter is a vowel excluding of y.

The total numbers of alphabet = 26
The vowels are (5) except 'y'.

probability = $\frac{5}{26}$

b): probability of letter ahead of 'j'.

The total number of alphabet are 25 excluding 'j'. also there are are 9 letter ahead of 'j'

probability = $\frac{9}{25}$

c): probability of letter after 'g'.

The total number of letter remaining 25 excluding g.; also letters after g(h to z) are 18.

probability = $\frac{18}{25}$

Question # 06.

each dice har 6 facer (1 to 6), by rolling two dice total outcomer are $6 \times 6 = 36$

a): getting a total of 8

for 8, we need 2 and 6 from two dices, or 3 and 5, or 4 and 4.

The probability of getting 2 on one and 6 on other ir

$$\frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$$

similarly for 2 and 6. $= \frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$

for 4 and 4 $= \frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$

There event is mutually exclusive (can't get both 2 and 6 at some time nor a 3 and 5 or 4 and 4); so the odd is.

Probability of getting a total of 8 $= \frac{1}{36} + \frac{1}{36} + \frac{1}{36}$

$$= \frac{3}{36} = \frac{1}{12}$$

b): probability of getting at most a total of 5.

- Total of 2: (1,1)
- Total of 3: (1,2), (2,1)
- Total of 4: (1,3), (2,2), (3,1)
- Total of 5: (1,4), (2,3), (3,2), (4,1)

i.e total 10 outcomes for total of 5 or less. There are 36 possible outcomes in total (two dice are rolled):

$$\text{probability} = \frac{10}{36} = \frac{5}{18}$$

Question #4):

A deck of card contains 52 cards divided in to four suits (hearts, diamonds clubs, spades) each containing 13 (10 face and Ace, sockets).

for both greater than 2 and less than 8 3, 4, 5, 6, 7.

first card,

less than 8 greater than 2 of 52 is

$\frac{5}{13}$ 5 favourable cards out of 13

after 1st card there are 51, 4 out of same set

for 2nd card it's $\frac{4}{51}$

for total:

$$\frac{5}{13} \times \frac{4}{51}$$

Probability $= \frac{20}{663}$.