HW-3

MA-485

NAME:- SHREYAS SRINIVASA

BLAZER ID :- SSRINIVA

Exercise 2.1

Ans:- TENNESSEE:- There are 4 E's, 2 N's, 2 S's & 1 T.

∴ The sample space here is given as:-

$S = \{E, N, S, T\}$

The probabilities are computed as:-

$P(E) = \frac{4}{9}$

$P(N) = \frac{2}{9}$

$P(S) = \frac{2}{9}$

$P(T) = \frac{1}{9}$

Exercise 2.2

Ans: $P(A) = \frac{1}{3}$

$P(A^c \cup B^c) = \frac{11}{12}$

$\therefore P(A \& B) = 1 - \frac{11}{12} = \frac{1}{12}$

Using laws of adding of probability :-

$P(B) = P(A \cup B) - P(A) + P(A \& B)$

$= \frac{3}{4} - \frac{1}{3} + \frac{1}{12}$

$= \frac{(9 - 4 + 1)}{12}$

$= 0.5$

∴ Probability is 0.5

Exercise 2.3

Ans:- $P(A) = 0.4$ & $P(B) = 0.7$

Sum = $0.4 + 0.7$

$= 1.1$

At least 10% of 1.1 has to be common, ∴ the minimum value of $P(A \cap B) = 0.1$.

The maximum value of $P(A \cap B)$ is 0.4 because we cannot have more than event A has.

Exercise 2.4

Ans:- Using laws of addition of probability :-

P (at least one) = P (exercise) + P (swim) − P (both)

$= 0.6 + 0.45 - 0.15$

$= 0.9$

$\therefore$ The required probability is 0.9 or 90%.

Example 2.5

Ans: $P(B_1) = 0.6$

$P(B_2) = 0.5$

$P(B_1 \cap B_2) = 0.4$

$\therefore P(B_1 \cup B_2) = P(B_1) + P(B_2) - P(B_1 \cap B_2)$

$= 0.6 + 0.5 - 0.4$

$= 0.7$

$\therefore P(\text{she likes neither brand}) = P(B_1^c \cap B_2^c)$

$= 1 - P(B_1 \cup B_2)$

$= 1 - 0.7$

$= 0.3$

Exercise 2.6

Ans:- A: 1 is there in hundredth place.
B: 1 is there in tenth place.
C: 1 is there in unit place.

$n(A) = 1 \times 10 \times 10 = 100$

$n(B) = 10 \times 1 \times 10 = 100$

$n(C) = 10 \times 10 \times 1 = 100$

$n(A \cap B) = 1 \times 1 \times 10 = 10$

$n(B \cap C) = 10 \times 1 \times 1 = 10$

$n(C \cap A) = 1 \times 10 \times 1 = 10$

$n(A \cap B \cap C) = 1 \times 1 \times 1 = 1$

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

$= 100 + 100 + 100 - 10 - 10 - 10 + 1$

$= 271$

$n(S) = 10 \times 10 \times 10 = 1000$

(5)

$$P(\text{at least one 1}) = \frac{n(A \cup B \cup C)}{n(S)}$$

$$= \frac{271}{1000}$$

$$= 0.271$$

Exercise 2.7

Ans: A: Number contains at least one 1.

A' = Number doesn't contain the digit 1.

No of numbers which doesn't 1 $= n(A') = 9 \times 9 \times 9 = 729$

$$P(A') = \frac{729}{1000} = 0.729$$

$$P(A) = 1 - P(A') = 1 - 0.729$$

$$= 0.271$$