Probability and Random Processes (15B11MA301)

Tutorial Sheet: 1 [C201.1]

(Approaches to Probability, Conditional Probability)

1. Three unbiased coins are tossed. What is the probability of getting at most two heads? **[Ans: 7/8]**

2. If $P(A) = 0.4, P(B) = 0.7$ and $P(A \cap B) = 0.3,$ find $P(\bar{A} \cap \bar{B})$. **[Ans: 0.2]**

3. A card is taken from a well shuffled pack of 52 cards. What is the probability of getting (*i*) either a black card or an ace or both, (*ii*) either an ace of diamond or an ace of hearts, (*iii*) either a diamond card or an ace or both? **[Ans: (i) 7/13 (ii) 1/26 (iii) 4/13]**

4. *A* and *B* are two events associated with an experiment. If P(A) = 0.4 and $P(A \cup B) = 0.7,$ find *P*(*B*) if (*i*) *A* and *B* are mutually exclusive, (*ii*) *A* and *B* are independent. **[Ans: (i) 0.3 (ii) 0.5]**

5. For any three events *A*, *B* and *C*, show that
$$P(A \cup B / C) = P(A / C) + P(B / C) - P(A \cap B / C).$$

6. If *A*, *B* and *C* are random events in a sample space and if *A*, *B* and *C* are pairwise independent and A is independent of $(B \cup C),$ then *A*, *B* and *C* are mutually independent.

7. In a random experiment, $P(A) = 1/12, P(B) = 5/12$ and $P(B / A) = 1/15,$ find $P(A \cup B)$. **[Ans: 89/180]**

8. One integer is chosen at random from the numbers 1, 2, 3, …, 100. What is the probability that the chosen number is divisible by
(*i*) 6 or 8, and
(*ii*) 6 or 8 or both.
[Ans: 1/5, 6/25]

9. Let w be a complex cube root of unity with $w \neq 1.$ a fair die is thrown three times. If x, y, z are the numbers obtained on the die, find the probability that $w^x + w^y + w^z = 0.$ **[Ans: 2/9]**

10. If $A \subset B,\ P(A) = 1/4$ and $P(B) = 1/3,$ find $P(A / B)$ and $P(B / A)$.
[Ans: $P(A / B) = 3/4$ and $P(B / A) = 1.$ **]**