COEP Technogical University

Department of Mathematics
(MA- 21001) Probability and Statistics for Engineers
T.Y. B. Tech. Semester V
Academic Year 2024-25 (Autumn Semester)
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1 Tutorial: Week 2

1. Consider the following data which gives the percentages of the families that are in the upper income level for some individuals in 15 schools of the city.
   72.2, 31.9, 26.5, 29.1, 27.3, 8.6, 22.3, 26.5, 20.4, 12.8, 25.1, 19.2, 24.1, 58.2, 68.1.
   Construct a relative frequency histogram of the data.

2. Twelve students compete in a race. In how many ways first three prizes be given? (Ans: 12 x 11 x 10 = 1320)

3. Suppose $P = \{a|\, a \text{ is an odd prime number } < 7\}$ and $Q = \{b|\, b \in \mathbb{N},\, 0 \le b < 5\}$, where $\mathbb{N}$ is a set of all natural numbers. Find the number of proper subsets of P and Q. (Ans: 3 and 15 respectively.)Hint: Set A with n elements have how many proper subsets??

4. Let 50 patients represent sample units. 20 out of 50 experience stomach ailment after the drug is given. Find sample proportion for which the drug was success and the sample proportion for which drug was not successful. Observe that sample proportion is the sample mean of 1 and 0 where we count 1 if success and 0 stands for failure of drug treatment. ANS: $0.6,\ 0.4$.

5. Suppose $X = \{x|\, x = 3n-1,\, n \in \mathbb{N},\, n < 3\}$ and $Y = \{y|\, y \text{ is a prime number } < 7\}$. Then find $X \cap Y$. (Ans: $X \cap Y = \{2, 5\}$)Hint: Write X and Y explicitly.

6. Four cards are drawn at random (without replacement) from a well shuffled deck of playing cards. Then find the probability that there is at least one ace among them. (Find answer correct upto four decimal places.) (Ans: 0.2813)Hint: Let us define event A as drawing at least one ace card and use $P(A^c)$.

7. Let E and F be two events with $P(E \cup F) = 0.7$, $P(E) = 0.5$, $P(F) = 0.3$. Find $P(E \cap F^c)$. (Ans: 0.4)Hint: First find $P(E \cap F)$ and use Venn diagram to find desired answer.

8. Suppose $P = \{a|\, a \in \mathbb{N},\, 2 < a < 7,\, a \text{ is prime}\}$ and $Q = \{2b+1|\, b \text{ is odd number below } 4\}$. Find $(P \cup Q) \cap (P \cap Q)$. (Ans: $\{3\}$)

9. Consider the research questions of describing parents' attitudes towards immunization, what proportion of them wants immunization against chicken pox for their last-born child, and whether this proportion differs by gender and age.   [CO2, 3Marks]

(a) Which data collection method is the most suitable one to answer the above questions: survey or experiment?

(b) Minimum how many variables are needed to answer the above question? Write variables needed and describe the scale of each of them.

10. Two lottery tickets are to be chosen from 20 for first and second prize. Find number of sample points in S. (Ans: 20_{P_2})