

Tutorial 3

1. A coin is biased so that the probability of obtaining a head is $\frac{2}{3}$. The coin is tossed four times. Find the probability of obtaining exactly two heads?
2. Suppose that 1% of the items made by a certain machine are defective. To keep a check on the quality of the output a batch of ten items is inspected occasionally. What is the probability that the next ten items inspected include more than one defective?
3. A group of three will be selected out of 5 boys and 7 girls. What is the probability that exactly 2 girls are in the selected group?
4. The number of phone calls, X received per day by a person has the following probability distribution.

x	0	1	2	3	4	≥ 5
$P(X=x)$	0.24	0.35	$2k$	k	0.05	0

- (i) Find the value of k .
 - (ii) Find the value of $E(X)$. (2019 Exam)
5. Screws are sold in packets of 15. Faulty screws occur randomly. A large number of packets were checked for faulty screws and the mean number of faulty screws per packet is found to be 1.2.
 - (i) Show that the variance of the number of faulty screws in a packet is 1.104.
 - (ii) Find the probability that a packet contains at most 2 faulty screws.
 - (iii) A person buys 8 packets of screws at random. Find the probability that there are exactly 7 packets in which there is at least 1 faulty screw.
(2019 Exam)
6. If A and B are two independent events with $P(A) < P(B)$, the probability that both A and B occur is $\frac{6}{25}$, and $P(A|B) + P(B|A) = 1$, find the value of $P(A)$. (2019 Exam)
7. The probabilities that three men hit a target are $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{6}$ respectively and each shoots once at the target.
 - i. Find the probability that all three men hit the target.
 - ii. Find the probability that exactly one of them hits the target. (2019 Exam)

SCS1307 Probability & Statistics

8. The germination percentage of a certain seed from plant nursery **A** is known to be 85% and from plant nursery **B** is known to be 75%. A farmer purchases 50% of seeds from nursery A and 50% from nursery B and plant on his land.

- (i) What is the probability that a randomly taken seed will be germinated? (2019 Exam)
- (ii) It is found that a seed is germinated, what is the probability that it has been purchased from plant nursery B? (2019 Exam)

9. The continuous random variable X has probability density function

$$f(x) = \begin{cases} kx(5-x) & 0 \leq x \leq 4 \\ 0 & \text{Otherwise} \end{cases} \quad \text{where } k \text{ is a constant.}$$

- (i) Find the value of k
- (ii) Find the value of $E(x)$

10. In a college, 60% of students study Mathematics (Event A), and 50% study Physics (Event B). It is also known that 30% of the students study both Mathematics and Physics. Determine whether events A and B are independent.