



Sri Lanka Institute of Information Technology

Year 02 – Semester II – 2022

Probability and Statistics – IT2110

Tutorial 04

- 1) The discrete random variable X has probability function given by $P(X=x) = cX^2$ where, $X= 1,2,3,4$. Find c and $E(X)$.

X	1	2	3	4
$P(X=x)$	c	$4c$	$9c$	$16c$

- 2) The random variable X has a binomial distribution with parameters $n=100$ and $p=0.8$. Find the mean and the variance of X .
- 3) A manufacturing process produces components which are free from any faults with probability p . Find the probability that in a sample of size 50 from a large batch there are fewer than 4 faulty components when $p = 0.95$. Find the probability that in a sample of size 50 there are fewer than 10 faulty when $p = 0.75$.
- 4) Use the table to give a suitable approximation to the probability that $X \geq 5$ where X is binomial random variable with parameters $p = 0.05$ and $n = 400$.
- 5) A car-pooling study shows that the number of passengers, X in a car (excluding the driver) is likely to assume the values 0,1,2,3 and 4 with probabilities given by the table.

X	0	1	2	3	4
$P(X=x)$	0.7	0.1	0.1	0.05	0.05

- a) Determine the probability of at least two passengers in a car.
- b) Find the cumulative distribution function of X and sketch it.
- c) Calculate,
- $E(X)$
 - $E(X^2)$
 - $V(X)$
 - $E(3X - 2)$
 - $\text{Var}(2X + 6)$

- 6) Suppose that in late summer, the Fremantle Surf Life Saving club makes an average of two surf rescues per day. Use the Poisson probability distribution to determine the probability that
- a) More than two rescues are made on a particular day.
 - b) Five surf rescues are made in a 3-day period.
- 7) An inventory study determines that, on average, demands for a particular item at a warehouse are made 5 times per day. What is the probability that on a given day this item is requested,
- a) More than 5 times?
 - b) Not at all?

[Extracted from Probability & Statistics for Engineers & Scientists – Ninth Edition by Walpole R. E. , Myers R. H. , Myers S. L. and Ye K.]

- 8) On average, 3 traffic accidents per month occur at a certain intersection. What is the probability that in any given month at this intersection,
- a) Exactly 5 accidents will occur?
 - b) Fewer than 3 accidents will occur?
 - c) At least 2 accidents will occur?

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- 9) The probability that a car has defective gearbox is 0.02. If I check the gearboxes of 140 cars what is the probability that I find,
- a) Two defectives?
 - b) More than 5 defectives?
 - c) Fewer than 4 defectives?