University of Ruhuna – Faculty of Technology
Bachelor of Engineering Technology Honors Degree
Bachelor of Information & Communication Technology Honors Degree
Level 2 (Semester II) Examination,
November/December 2025
Academic year 2023/2024

Course Unit: TMS2213: Probability & Statistics — Duration: 2 hours

- **This paper contains 4 questions.**
- **All symbols have their usual meanings.**
- **Answer all (04) questions.**
- **You may refer to the last page for equations if needed.**

1.

Following data collection is pizza delivery time (in minutes) for 15 days in Rico's Pizza Place and Nico's Pizza Place.

Rico's	30	40	45	42	31	32	28	39	44	52	33	34	35	42	41
Nico's	30	40	30	32	25	28	29	32	41	40	32	39	38	35	36

(i) Give a descriptive statistical summary comparing both data sets using box and whiskers plots. (50 marks)

(ii) Calculate the standard deviations of each data set. (20 marks)

(iii)Use Chebyshev's theorem to compare the delivery data distributions. (20 marks)

(iv)Based on your analysis, where should we order pizza tonight? (10 marks)

2.

In Kamburupitiya area, it rains 30% of the day. A weather forecaster correctly predicts rain 80% of the time when it rains. The same forecaster correctly predicts no rain, 90% of the time when it doesn't rain.

If the following events are defined.

R: It rains on a given day

NR: It doesn't rain on a given day

F: The forecast predicts there will be rain

NF: The forecast predicts there will be no rain

(i) Write down the given probabilities. (4x5 marks)

a) P(R)

b) P(F|R)

c) P(NF|NR)

d) P(F|NR)

(ii) Find P(F), the probability that the forecast predicts there will be rain. (30 marks)

(iii)If the forecast predicts there will be rain, what is the probability that it will rain.

(30 marks)

(iv)How reliable the forecasting when it says it will rain? (20 marks)

3.

(i) If a fair coin is tossed 3 times, find the probability of getting exactly two heads.

(ii) The probability that a student entering Technology Faculty will graduate is 0.4. Calculate the probability that out of 3 students at the faculty none will graduate.

(iii)The mean and the standard deviation of a binomial distribution are 100 and 5 respectively. Find the number of trials(approximately).

(iv)If a fair coin is tossed 4 times, find the probability that tail appears an odd number of times.

(4x25 marks)

4. The number of miles that Kavindu's motorbike will travel on one liter of petrol can be modelled by a normal distribution with mean 135 km and standard deviation of 12 km.

(i) Given that Kavindu starts a journey with one liter of petrol in his bike's tank, find the probability that, without refilling, he can travel

a) More than 111 km (20 marks)

b) Between 141 km and 150 km (20 marks)

(ii) If the motorbike company claims that their bike model always gives at least 160 km per one liter, comment on whether this claim is reasonable based on the distribution.

(40 marks)

(iii)Find the mileage range that contains 95% of the bikes' performance. (20 marks)

$$\textit{Standard Deviation of a sample} = \sqrt{\frac{\sum_{i=1}^{n} x_i^2 - \frac{(\sum_{i=1}^{n} x_i)^2}{n}}{n-1}}$$

$$\textit{Standard Deviation of a population} = \sqrt{\frac{\sum_{i=1}^{N} x_i^2 - \frac{(\sum_{i=1}^{N} x_i)^2}{N}}{N}}$$

For Discrete Probability Distributions.

Mean = $E(x) = \sum_{i=1}^{n} x_i p(x_i)$

Variance = $E(x^2) - \big(E(x)\big)^2 = \sum_{i=1}^{n} x_i{}^2 p(x_i) - (\sum_{i=1}^{n} x_i p(x_i))^2$

For Binomial Probability Distribution.

Standard Deviation = $\sigma = \sqrt{npq}$

Mean = $\mu = np$

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