Department of Industrial Engineering
University of Stellenbosch

Simulasie 442 : Simulation 442
2025

Tutoriaal 4 *Tutorial 4*	Punt: 85 *Mark:*	Ingeedatum: **15-08-2025** (10:00) B3003 *Due date:*
Instruksies:	Formatteer alle syfers sinvol. U mag in groepe van **twee** of minder werk om die vrae te beantwoord. Handig slegs een hardekopie van u antwoordstel in. Gebruik Excel, R of Matlab vir u berekenings. Die data vir hierdie tutoriaal is beskikbaar in die lêer Tut04_2025_RawData.xlsx. **Hierdie tutoriaal is verpligtend**. **Indien u nalaat om die vereistes betyds na te kom, sal u die module sak**.	
Instructions:	*Format all numbers sensibly.* *You may work in groups of **two** or less when answering the questions.* *Submit one hardcopy only.* *Use Excel, R or Matlab for your calculations.* The data for this tutorial is available in the file Tut04_2025_RawData.xlsx. ***This tutorial is compulsory**.* ***You will fail the module if you do not comply with the requirements, on time**.*	

Download the Excel file named **Sim442_Tut04_2025_RawData** from STEM-Learn.

Question 1 [13]

Jamie frequently visits the Sanga coffee shop on campus during the busy morning rush to study for her upcoming exams. She becomes curious about customer behavior and decides to track how many coffee orders are placed every 15-minute interval during her study sessions. She meticulously records these observations and enters the data into the Excel file Tut04_2025_RawData.xlsx on the data sheet labelled 'Question 1'.

8	12	6	9	3	11	4	7
5	2	13	8	10	6	9	4
11	7	3	15	5	8	2	12
6	14	4	7	9	3	10	8
2	5	9	11	6	13	7	1

Table 1: Question 1

(a) Construct an empirical distribution for this dataset and create a graphical representation of the distribution. [9]

(b) Determine how many coffee orders correspond to the cumulative probabilities of 0.40 and 0.85. [4]

Question 2 [16]

Luan collected data for his final-year project. He stores this data in the Excel file *Sim442_Tut04_2025_RawData.xlsx* on the data sheet labelled 'Question 2'. Luan claims that, according to the empirical distribution of the dataset, the data value associated with a probability of 0.45 is 2.2.

Investigate this claim, stating whether you agree or disagree with it. Provide evidence to substantiate your conclusion.

Question 3 [19]

Trucks arrive at a weigh bridge according to the data in the Excel file *Sim442_Tut04_2025_RawData.xlsx* provided, on sheet 'Question 3'. Determine if the number of arrivals per day follows a Poisson distribution with $\lambda = 4$, at the 5% level of significance. Note: λ was not estimated from the data.

Question 4 [21]

The organisers of the Stellenbosch Street Soiree want to understand the demand for tickets. As soon as tickets go on sale, they record the inter-arrival times (in seconds) of users logging into their website. The data can be found in the Excel file *Sim442_Tut04_2025_RawData.xlsx* provided, on sheet 'Question 4'.

They estimate that the data follows an exponential distribution. Determine whether the data follows the proposed distribution or not using a 5% level of significance.

Question 5 [16]

The product delivery interval rate of a machine is described by

$$F(x) = 1 - \exp^{-\frac{x}{116}} .$$

Determine if the following data points were taken from the product delivery time sheet.

122 133 106 128 135 126

Total: Cross-check: 85
