

College of Computer Science & Engineering at Yanbu Department of Computer Science.	جامعة طيبة TAIBAH UNIVERSITY	كلية علوم وهندسة الحاسبات ببنبع قسم علوم الحاسبات
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Midterm. Exam

Academic Year 1445 - First Semester

Exam Information معلومات الامتحان		
Course name	الإحتمالات والإحصاء للمهندسين - الاحتمالات والاحصاء الهندسي	اسم المقرر
Course Code	STAT 301 – STAT 305	رمز المقرر
Exam Date	7 / 10 / 2024	تاريخ الامتحان
Exam Time		وقت الامتحان
Exam Duration	1 Hour	مدة الامتحان
Classroom No.		رقم قاعة الاختبار
Instructor Name	Prof. Mostafa Elhosseini	اسم استاذ المقرر

Student Information معلومات الطالب		
Student's Name		اسم الطالب
ID number		الرقم الجامعي
Section No.		رقم الشعبة
Serial Number		الرقم التسلسلي

General Instructions:

تعليمات عامة:

- Your Exam consists of **3 PAGES** (except this paper) (عدد صفحات الامتحان **3 صفحة**. (باستثناء هذه الورقة)
- Phones and smart devices are forbidden inside the hall. (يمنع استخدام الهواتف والأجهزة الذكية داخل القاعة).

هذا الجزء خاص باستاذ المادة

This section is ONLY for instructor

#	Course Learning Outcomes (CLOs)	Related Question (s)	Points	Final Score
1	Present data in charts and tables	Q1 – Part A	2	
2	Compute measures of location and measures of variability	Q1 – Part B	4	
3	Acquire basic concepts of probability theory	Q2	6	
4				
5				
6	Analyze measures of location and measures of variability	Q3	2	
7				
8	Compute probability models for a given problem.	Q4 – Part A	3	
9	Implement probability methods to solve real-world problems.	Q4 – Part B	3	

Question 1: Points: 6

CLO #1,2

(A) Points: 3

CLO #1

A survey was conducted to record the number of **cups of coffee** consumed daily by **25 employees** in an office. The data are as follows:

2, 3, 1, 4, 2, 3, 2, 1, 3, 2, 4, 3, 2, 1, 3, 2, 2, 3, 4, 2, 1, 2, 3, 2, 1

Construct a **frequency table** for the data.

# Cups	Frequency
1	5
2	10
3	7
4	3

(B) Points: 4

CLO #2

(i) Which number of cups was the **most consumed**?

2

(ii) Calculate the **mean** number of cups of coffee consumed daily

$$\begin{aligned}
 \text{Total} &= 1 \times 5 + 2 \times 10 \\
 &\quad + 3 \times 7 + 4 \times 3 \\
 &= 58 \\
 \text{Mean} &= 58 / 25 = 2.32
 \end{aligned}$$

(iii) Determine the **median number** of cups of coffee consumed.

$$\begin{aligned}
 \text{Median position} &= \frac{25+1}{2} \\
 &= 13^{\text{th}} \text{ value} \\
 \text{Median} &= 2
 \end{aligned}$$

(iv) Compute the **range** of the data.

$$\begin{aligned}
 \text{Range} &= \text{Max} - \text{min} \\
 &= 4 - 1 = 3
 \end{aligned}$$

Question 2: Points: 6

CLO #3

- (1) A coin is flipped and a die is rolled. What is the probability of getting a head on the coin and a 4 on the die?
 - (a) $1/2$
 - (b) $1/6$
 - (c) $1/12$
 - (d) $1/8$
- (2) In a certain city, 80% of drivers wear seatbelts while driving. If a traffic officer stops a driver at random, what is the probability that the driver is not wearing a seatbelt?
 - (a) 0.2
 - (b) 0.8
 - (c) 0.5
 - (d) 0.1
- (3) In a town with 10,000 drivers, the annual probability of a driver dying in a car accident is 0.001. How many drivers are expected to die in car accidents in the town this year?
 - (a) 1
 - (b) 10
 - (c) 100
 - (d) 5

In a study of 1,000 car accident cases, data was collected on **whether** the drivers were **wearing seatbelts** and **whether** they

survived the accident. The results are as follows:

Drivers **wearing** seatbelts who **survived**: 680

Drivers **wearing** seatbelts who did **not survive**: 20

Drivers **not wearing** seatbelts who **survived**: 270

Drivers **not wearing** seatbelts who **did not survive**: 30

- (4) What is the probability that a randomly selected driver was wearing a seatbelt?
 - (a) 0.68
 - (b) 0.70
 - (c) 0.75
 - (d) 0.80
- (5) What is the probability that a driver did not survive the accident?
 - (a) 0.05
 - (b) 0.10
 - (c) 0.15
 - (d) 0.20
- (6) What is the probability that a driver was wearing a seatbelt **given that** they survived?
 - (a) 0.6828
 - (b) 0.7158
 - (c) 0.7019
 - (d) 0.8099

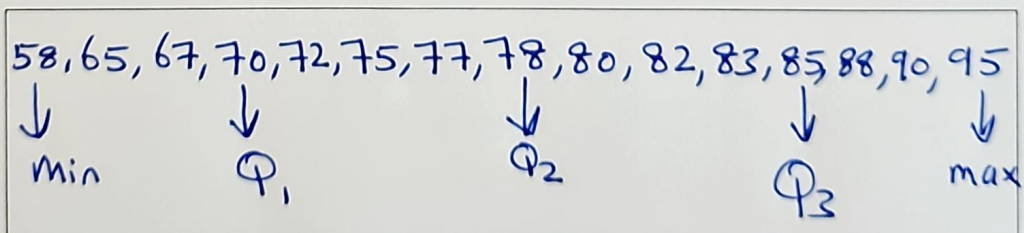
Question 3: Points: 2

CLO #6

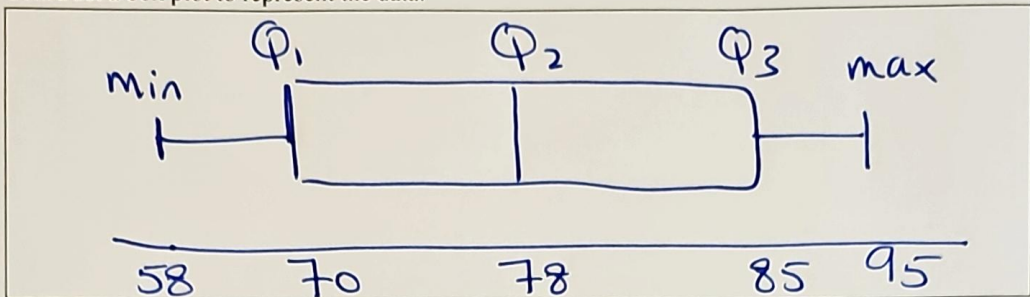
A group of 15 students took a statistics test, and their scores out of 100 are as follows:

58, 72, 85, 90, 67, 75, 80, 95, 88, 78, 82, 70, 65, 77, 83

- (i) Determine the first quartile (Q1), second quartile (Q2), and third quartile (Q3) of the test scores.



(ii) Construct a box plot to represent the data.



Question 4: **Points: 6**

CLO #8,9

A small batch contains 3 electronic components. Historically, 25% of the components produced are defective. A quality control inspector tests all 3 components.

(A) **Points: 3**

CLO #8

List all possible combinations of defective (D) and non-defective (N) components in the batch.

NNN
 NND
 NDN
 NDD *
 DNN
 DND *
 DDN *
 DDD

(B) **Points: 3**

CLO #9

- What is the probability that exactly two components are defective?

$$\begin{aligned}
 & * NDD, DND, DDN \\
 & P(NDD) = 0.75 \times 0.25 \times 0.25 \\
 & P(DND) = 0.25 \times 0.75 \times 0.25 \\
 & P(DDN) = 0.25 \times 0.25 \times 0.75 \\
 & p = 0.1406 = 14.06\%
 \end{aligned}$$

- What is the probability that at least one component is defective?

$$\begin{aligned}
 P(NNN) &= 0.75 \times 0.75 \times 0.75 \\
 &= 0.421875 \\
 p(\text{at least one defective}) &= 1 - P(\text{No Defective}) \\
 &= 0.578125
 \end{aligned}$$

Best Wishes

Dr. Mostafa Elhosseini

Professor of AI – Taibah University