KOLEJ YAYASAN PELAJARAN JOHOR
FINAL EXAMINATION

COURSE NAME	:	INTRODUCTION TO STATISTICS
COURSE CODE	:	DHR1073
EXAMINATION	:	JUNE 2023
DURATION	:	3 HOURS

INSTRUCTION TO CANDIDATES
ARAHAN KEPADA CALON

1. This examination paper consists of **TWO (2)** parts: / *Kertas soalan ini mengandungi DUA (2) bahagian:*
   PART A (10 Marks) / *Bahagian A (10 Markah)*
   PART B (30 Marks) / *Bahagian B (30 Markah)*

2. Candidates are not allowed to bring any material to examination room except with the permission from the invigilator. The formula was attached at the back question paper. / *Calon tidak dibenarkan untuk membawa sebarang bahan/nota ke bilik peperiksaan tanpa arahan/kebenaran daripada pengawas. Rumus dilampirkan di belakang kertas soalan peperiksaan.*

3. Please check to make sure that this examination pack consists of: / *Pastikan kertas soalan peperiksaan ini mengandungi:*
   i. Question Paper / *Kertas Soalan*
   ii. Answering Booklet / *Buku Jawapan*

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO /
JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

This examination paper consists of 9 printed pages including front page
Kertas soalan ini mengandungi 9 muka surat termasuk kulit hadapan

PART A / *BAHAGIAN A*

This part contains of **ONE (1)** question. Answer **ALL** questions in the Answering Booklet.

*Bahagian ini mempunyai **SATU (1)** soalan. Jawab **SEMUA** soalan di dalam Buku Jawapan.*

QUESTION 1

A survey was conducted on 12 patients in a Hospital Y. The number of days they stayed in the hospital was recorded as follows.

3	7	2	1	5	1
4	8	10	14	1	6

a) Calculate the sample mean and standard deviation of the above data.

(5 marks / *markah*)

b) Identify the mode and state the distribution of the data.

(2 marks / *markah*)

c) Given that the mean and standard deviation of patients at Hospital K were 6.2 and 5.3 respectively. Determine which hospital has a more consistent distribution.

(3 marks / *markah*)

SOALAN 1

Satu tinjauan telah dijalankan ke atas 12 pesakit di Hospital Y. Bilangan hari mereka tinggal di hospital direkodkan seperti berikut.

3	*7*	*2*	*1*	*5*	*1*
4	*8*	*10*	*14*	*1*	*6*

a) Kirakan min dan sisihan piawai bagi data di atas.

b) Tentukan mod dan nyatakan bentuk taburan data di atas.

c) *Diberi min dan sisihan piawai pesakit di Hospital K ialah 6.2 dan 5.3 jam. Tentukan taburan hospital yang lebih konsisten.*

[10 MARKS / *MARKAH*]

PART B / *BAHAGIAN B*

This part contains of **THREE (3)** questions. Answer **ALL** questions in the Answering Booklet.

*Bahagian ini mempunyai **TIGA (3)** soalan. Jawab **SEMUA** soalan di dalam Buku Jawapan.*

QUESTION 1

The marketing manager of Muthaiya trading company believes that there is a relationship between the amount of mileage claims made by salesmen and their monthly sales. The table below shows the amount of sales and the mileage claims made by seven salesmen.

Salesmen	Mileage claims (RM'00)	Sales (RM'000)
A	8	12
B	5	10
C	8	14
D	11	16
E	9	15
F	12	19
G	7	11

a) Calculate the Pearson's Product Moment Correlation coefficient and comment on the value obtained.

(3 marks / *markah*)

b) Find the linear regression equation using the least square method.

(3 marks / *markah*)

c) If the salesmen did not submit any mileage claim, what is the amount of expected sales?

(2 marks / *markah*)

d) Estimate the amount of sales if the mileage claims is RM950.

(2 marks / *markah*)

SOALAN 1

Pengurus pemasaran syarikat perdagangan Muthaiya percaya bahawa terdapat hubungan antara jumlah tuntutan perjalanan yang dibuat oleh jurujual dan jualan bulanan mereka. Jadual di bawah menunjukkan jumlah jualan dan tuntutan perjalanan yang dibuat oleh tujuh jurujual.

Jurujual	*Tuntutan Perjalanan (RM'00)*	*Jualan Bulanan (RM'000)*
A	*8*	*12*
B	*5*	*10*
C	*8*	*14*
D	*11*	*16*
E	*9*	*15*
F	*12*	*19*
G	*7*	*11*

a) *Kirakan pekali Korelasi Momen Produk Pearson dan komen nilai yang diperolehi.*

b) *Dapatkan persamaan linear regresi menggunakan kaedah kuasa dua terkecil.*

c) *Jika jurujual tersebut tidak membuat sebarang tuntutan, berapakah anggaran jualan bulanan mereka?*

d) *Anggarkan jualan bulanan jika jumlah tuntutan perjalanan jurujual ialah RM950.*

QUESTION 2

The following table contains information on quantities and prices of items sold at Samlin's shop for 2021 and 2022.

Item	Price (RM)		Quantity	
	2021	2022	2021	2022
Book	10.50	11.80	500	650
Magazine	5.50	5.80	800	900
Paper	8.00	9.00	400	510

Using the year 2021 as the base year, calculate:

a) the simple aggregate quantity index for the year 2022.

(2 marks / markah)

b) the Laspeyres' price index for the year 2022 and interpret the value obtained.

(4 marks / markah)

c) the Paasche's quantity index for the year 2022 and interpret the value obtained.

(4 marks / markah)

SOALAN 2

Jadual berikut mengandungi maklumat tentang kuantiti dan harga barang yang dijual di kedai Samlin pada tahun 2021 dan tahun 2022.

Item	*Harga (RM)*		*Kuantiti*	
	2021	*2022*	*2021*	*2022*
Buku	*10.50*	*11.80*	*500*	*650*
Majalah	*5.50*	*5.80*	*800*	*900*
Kertas	*8.00*	*9.00*	*400*	*510*

Menggunakan tahun 2021 sebagai tahun asas, kirakan:

a) indeks kuantiti agregat untuk tahun 2022.

b) *indeks harga Laspeyres untuk tahun 2022 dan terangkan nilai yang diperoleh.*

c) *indeks kuantiti Paasche untuk tahun 2022 dan terangkan nilai yang diperoleh.*

QUESTION 3

A company producing batteries claims that its batteries last an average of 13 months with a standard deviation of 3.2 months. A sample of 16 batteries was tested. The mean life of these batteries was 12 months. Using the 5% level of significance, is there evidence to indicate that the mean lifetime of batteries is more than 13 months?

(10 marks / markah)

SOALAN 3

Sebuah syarikat yang menghasilkan bateri mendakwa bahawa bateri mereka bertahan selama 13 bulan dengan sisihan piawai 3.2 bulan. Sampel sebanyak 16 biji beteri telah diuji. Min hayat bateri tersebut ialah 12 bulan. Menggunakan aras keertian 5%, adakah terdapat bukti untuk menunjukkan min jangka hayat bateri lebih daripada 13 bulan?

[30 MARKS / *MARKAH*]

END OF QUESTION PAPER / *KERTAS SOALAN TAMAT*

APPENDIX I

Sample Measurements

1. Mean

$$\bar{x} = \frac{\sum x}{n}$$

2. Standard Deviation

$$s = \sqrt{\frac{1}{n-1}\left(\sum x^2 - \frac{(\sum x)^2}{n}\right)}$$

3. Coefficient of Variation

$$CV = \frac{s}{\bar{x}} \times 100$$

Correlation and Regression

1. Pearson's Product Moment Correlation Coefficient

$$r = \frac{\sum xy - \frac{\sum x \sum y}{n}}{\sqrt{\left[\sum x^2 - \frac{(\sum x)^2}{n}\right]\left[\sum y^2 - \frac{(\sum y)^2}{n}\right]}}$$

2. The least-square regression line, $y = a + bx$

i. $$b = \frac{(\sum xy) - \left(\frac{(\sum x)(\sum y)}{n}\right)}{\left((\sum x^2) - \frac{(\sum x)^2}{n}\right)}$$

ii. $$a = \frac{\sum y}{n} - b\left(\frac{\sum x}{n}\right)$$

Index Numbers

1. Laspeyres' price index $= \frac{\sum p_t q_0}{\sum p_0 q_0} \times 100$
2. Paasche's quantity index $= \frac{\sum q_t p_t}{\sum q_o p_t} \times 100$
3. Simple Aggregate quantity index $= \frac{\sum q_t}{\sum q_0} \times 100$

Where:

p_0 : price of the base year

p_t : price of the current year

q_0 : quantity of the base year

q_t : quantity of the current year

Hypothesis Testing: One-Sample Tests

$$Z - test$$

$Z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}}$, σ known and n < 30

Critical value for Z-distribution:

α	Z_α	$Z_{\frac{\alpha}{2}}$
0.01	2.3263	2.5758
0.025	1.9600	2.2400
0.05	1.6449	1.9600
0.005	2.5758	2.8100