

**FINAL EXAMINATION****DIPLOMA IN COMPUTER SCIENCE**

COURSE	: STATISTICS
COURSE CODE	: STA2163
DURATION	: 2 HOURS 30 MINUTES

INSTRUCTIONS TO CANDIDATES:

1. This question paper consists of **FOUR (4)** questions.
2. Answer **ALL** the questions in the Answer Booklet provided.
3. Please check to make sure that this examination pack consists of:
 - i. The Question Paper
 - ii. An Answer Booklet
 - iii. Appendix 1(1) and 1(2)
 - iv. Appendix 2
 - v. A graph paper
4. Do not bring any material into the examination hall. Electronic calculator is allowed.
5. Please write your answer using permanent ink.

MYKAD/ PASSPORT NO : _____

ID. NO. : _____

LECTURER : _____

SECTION : _____

DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO

This question paper consists of 6 printed pages including the front page

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QUESTION 1

A psychology lecturer conducted a study to examine the relationship between students' daily time spent on TikTok and their attention span performance in a short concentration test. The attention span test was scored out of 100, where higher scores indicate better focus and concentration. Data were collected from 12 diploma students, as shown in Table 1.

Table 1

TikTok Hours per Day	0.5	1.0	1.5	2.0	3.0	4.0	5.0	2.5	3.5	4.5	6.5	5.5
Attention Score	92	88	72	78	74	68	62	90	76	60	55	58

- Identify the independent variable and the dependent variable in this study.
(2 marks)
- Plot a scatter diagram for the data in Table 1. Hence, describe the type of linear correlation between TikTok screen time and attention span score.
(4 marks)
- Name the statistical measure used to determine the relationship between TikTok screen time and attention span score. Then, calculate the value of this measure.
(5 marks)
- Calculate the coefficient of determination and explain its meaning.
(3 marks)
- Find the linear regression equation using the least squares method.
(5 marks)
- Interpret the meaning of y-intercept, a obtained in part (e).
(2 marks)
- Predict the attention span score of a student who spends 6.2 hours per day on TikTok. Comment on the reliability of this estimation.
(4 marks)

(Total: 25 marks)

QUESTION 2

- a. A survey was conducted among 220 students to examine their preferred online shopping platform (Shopee or Lazada) and the payment method they commonly use (E-Wallet, Online Banking or Cash on Delivery). The results are summarized in Table 2.

Table 2

Payment Method	Shopee	Lazada
E-Wallet	80	30
Online Banking	60	20
Cash on Delivery	20	10

If a student is selected at random, find the probability that:

- the student prefers Shopee. (2 marks)
- the student uses Cash on Delivery and prefers Lazada. (2 marks)
- the student is either an E-Wallet user or prefers Shopee. (4 marks)
- the student uses Online Banking, given that they prefer Lazada. (3 marks)
- Determine whether the events Cash on Delivery and Shopee are statistically independent. Explain your answer. (4 marks)

- b. A campus kiosk tracks the number of bubble tea cups sold daily during weekdays. Management wants to analyze daily sales to plan stock and staffing. The number of cups sold per day, X , follows the probability distribution below:

Table 3

Cups Sold, X	10	11	12	13	14	15
$P(X)$	0.08	k	0.12	0.20	0.18	0.12

- Find the probability that the kiosk sells exact 11 cups.
(1 mark)
- Find the probability that the kiosk sells more than 12 cups in a day.
(3 marks)
- Calculate the mean and the variance of the number of cups sold per day.
(6 marks)

(Total: 25 marks)

QUESTION 3

- a. A university conducted a study on the duration of gaming sessions among students. The results show that the number of hours a student spends in a gaming session follows a normal distribution with a mean of 3 hours and a standard deviation of 0.6 hours. If a student is randomly selected, find the probability that the student plays
- i. for less than 2.5 hours.
(5 marks)
 - ii. between 3.2 hours and 3.5 hours.
(7 marks)
- b. A food delivery service monitors delivery times (in minutes) for its riders. The delivery times are normally distributed with a mean of 40 minutes and a standard deviation of 6 minutes. A random sample of 50 deliveries is selected.
- i. Find the standard deviation of the sample mean.
(1 mark)
 - ii. Find the probability that the mean delivery time of the sample is more than 38 minutes.
(5 marks)
 - iii. Find the probability that the mean delivery time is between 39 and 42 minutes.
(7 marks)
- (Total: 25 marks)

QUESTION 4

- a. A university IT lab wants to estimate the average battery usage (in hours) of a new gaming laptop model. They test 50 laptops and find a sample mean battery life of 6 hours, with a sample standard deviation of 0.8 hours.
- i. Find the best point estimate of the population mean.
(1 mark)
 - ii. Construct a 99% confidence interval for the population mean. Interpret the value obtained.
(8 marks)
 - iii. If the lab wants the margin of error within 0.2 hours, how many laptops should be sampled for a 95% confidence level?
(4 marks)
- b. The campus cafeteria claims that students drink an average of 2 cups of coffee per day. A sample of 80 students shows a mean of 2.3 cups with a standard deviation of 0.5 cups. Using a 0.05 significance level, test whether the actual average differs from the claim.
- i. State the hypotheses and identify the claim.
(2 marks)
 - ii. Find the critical value and state the decision rule.
(2 marks)
 - iii. Compute the test value.
(4 marks)
 - iv. Make the decision based on the test value in (iii).
(2 marks)
 - v. Summarize the results.
(2 marks)

(Total: 25 marks)

(TOTAL: 100 MARKS)**END OF QUESTION PAPER**

APPENDIX 1(1)

Probability Theory and Probability Distributions

i. Addition rule: $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

ii. Multiplication rule:

$$P(A \cap B) = P(B) \cdot P(A|B)$$

$P(A \cap B) = P(A) \cdot P(B)$ if and only if A and B are independent events

iii. Conditional probability: $P(A|B) = \frac{P(A \cap B)}{P(B)}$

iv. Mean for a probability distribution: $E(x) = \sum x \cdot p(x)$

v. Variance for a probability distribution: $Var(x) = \sum x^2 P(x) - [E(x)]^2$

Correlation and Regression

i. Pearson's Product Moment Correlation Coefficient

$$r = \frac{n(\sum XY) - (\sum X)(\sum Y)}{\sqrt{[n(\sum X^2) - (\sum X)^2][n(\sum Y^2) - (\sum Y)^2]}}$$

ii. The least-squares regression line of Y against X , $Y = a + bX$

$$b = \frac{n(\sum XY) - (\sum X)(\sum Y)}{n(\sum X^2) - (\sum X)^2}$$

$$a = \frac{(\sum y)}{n} - b \frac{(\sum x)}{n}$$

APPENDIX 1(2)

Normal Distribution

- i. Standardized score: $z = \frac{x-\mu}{\sigma}$

Sampling Distribution

- i. Mean of $\bar{x}$: $\mu_{\bar{x}} = \mu$
- ii. Standard deviation of $\bar{x}$: $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$
- iii. z value for $\bar{x}$: $z = \frac{\bar{x}-\mu}{\frac{\sigma}{\sqrt{n}}}$

Estimation of mean

- i. Confidence interval μ for a large sample

$$\bar{x} - z \frac{\sigma}{\sqrt{n}} < \mu < \bar{x} + z \frac{\sigma}{\sqrt{n}}$$

or

$$\bar{x} - z \frac{s}{\sqrt{n}} < \mu < \bar{x} + z \frac{s}{\sqrt{n}}$$

- ii. Minimum sample size required of the population mean:

$$n = \left(\frac{z\sigma}{E} \right)^2$$

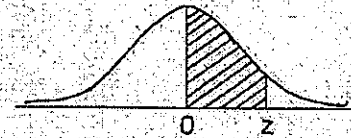
APPENDIX 2

Table 5
NORMAL DISTRIBUTION

Statistical Table

The following table gives the areas under the standard normal curve from 0 to z:

Eg: $P(0 \leq z \leq 1.24) = 0.3925$



z	0	1	2	3	4	5	6	7	8	9
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0754
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2258	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549
0.7	.2580	.2612	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2996	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998
3.6	.4998	.4998	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.7	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.8	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.9	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000

