UNIVERSITI POLYTECH MALAYSIA
UPTM

FINAL EXAMINATION

BACHELOR OF ACCOUNTANCY (HONOURS)

COURSE	:	**STATISTICS FOR ACCOUNTING**
COURSE CODE	:	**STA2173**
DURATION	:	**3 HOURS**

INSTRUCTIONS TO CANDIDATES:

1. This question paper consists of **FOUR (4)** questions.
2. Answer ALL 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)
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

This question paper consists of 10 printed pages including the front page

QUESTION 1

a. A researcher is constructing an index number using 2019 as the base year, even though major economic disruptions occurred that year. Explain whether 2019 is a suitable base year.

(2 marks)

b. The table below shows the prices for three items used in a community learning centre in 2023, 2024 and 2025.

Table 1

Item	Quantity (weight)	Price per unit (RM)		
		2023	2024	2025
USB Drive	260	18.00	20.00	21.60
A4 Drawing Paper Pack	380	7.50	8.20	8.50
Whiteboard Marker	520	2.20	2.50	2.65

i. For each item, express the change in price from 2024 to 2025 as an index number, taking 2024 as the base year.

(3 marks)

ii. Using the index values from (i), calculate the simple average price index for 2025.

(3 marks)

iii. Determine the weighted aggregate price index for 2025 using 2023 as the base year.

(3 marks)

c. A campus innovation hub tracks its spending on three technical consumables. The table below shows the unit cost and quantity used in 2024 and 2025.

Table 2

Item	Price per unit (RM)		Quantity	
	2024	2025	2024	2025
3D Printing Resin	85.00	107.00	40	55
Sensor Module	48.00	60.00	120	100
Circuit Boards	15.00	p	200	250

Use 2024 as the base year.

i. Calculate the Laspeyres quantity index for the year 2025 and explain its meaning.

(4 marks)

ii. Given the Laspeyres price index for the three items in 2025 is 124, determine the price per unit of circuit boards, p in 2025.

(3 marks)

d. An auditing firm is reviewing the monthly variance in operating expenses (in RM'000) reported by several branch offices of a retail company. A sample of 16 branches was selected and the descriptive statistics for the expense variance are shown in the table below.

Table 3

Operating Expenses Variance (RM '000)	
Mean	12.63
Standard Error	0.92
Median	12.50
Mode	11
Standard Deviation	3.68
Sample Variance	13.54
Kurtosis	–0.21
Skewness	0.27
Range	12
Minimum	7
Maximum	19
Sum	202
Count	16

i. Based on the skewness value in Table 3, suggest the shape of the distribution.

(1 mark)

ii. Using the data in Table 3, determine whether the operating expenses variance appears to follow a normal distribution.

(2 marks)

iii. Normality can be evaluated visually. Choose **ONE (1)** graphical method and explain the features you would expect to see in the graph if the expenses variance is normally distributed.

(2 marks)

iv. Additional normality tests were conducted on the dataset, and the following *p*-values were obtained:

Shapiro Wilk test: $p = 0.87$

At the 5% significance level, state whether the data are normally distributed based on the test.

(2 marks)

(Total: 25 marks)

QUESTION 2

a. A university library is evaluating whether a new study-space layout influences students' average daily time spent in the library. After the new layout was introduced, a random sample of 20 students was selected. The summary statistics are shown in Table 4.

Table 4

Daily Library Time (hours)	n	Mean	Std. Deviation
	20	3.60	0.80

i. Explain why a one-sample t-test is suitable for analysing the data in this study.
(1 mark)

ii. State the null and alternative hypotheses to test whether the average daily library time is 4 hours.
(2 marks)

iii. Construct a 95% confidence interval for the average daily library time and explain what the interval represents (Given $t_{0.025,19} = \pm 2.093$).
(5 marks)

iv. Based on the confidence interval obtained in (iii), state whether the average daily library time can reasonably be considered 4 hours.
(3 marks)

b. A research team is evaluating the effectiveness of a new asphalt mixture in reducing road surface noise. Noise levels (in decibels, dB) were measured on selected roads before and after they were resurfaced with the new mixture. The results of the analysis are shown in Table 5.

Table 5

	Before	After
Mean	79.217	73.4
Variance	2.500	2.527
Observations	12	12
Pearson Correlation	0.954	
Hypothesized Mean Difference	0	
df	11	
t Stat	***G***	
P(T<=t) one-tail	0.000	
t Critical one-tail	1.796	
P(T<=t) two-tail	0.000	
t Critical two-tail	2.201	

i. Identify the type of test applied in this analysis.

(1 mark)

ii. State the null and alternative hypotheses.

(2 marks)

iii. Find the value of ***G,*** given the standard deviation of the differences, $s_d = 0.48$.

(2 marks)

iv. Using the *p*-value approach for a two-tailed test at $\alpha = 0.05$, determine whether there is a significant difference in mean road surface noise levels before and after resurfacing.

(3 marks)

c. A study assessed the network stability of two Wi-Fi router models, Router Q and Router Z. The researcher aims to determine, at the 10% significance level, whether there is a significant difference in the mean packet loss percentage between the two models. A random sample of routers from each model was tested, and the average packet loss during a 2-hour transmission test was recorded. The findings are shown in the table below, assuming equal variances is appropriate.

Table 6

	Router Q	*Router Z*
Mean	11.258	10.175
Variance	0.177	0.080
Observations	12	12
Pooled Variance	0.129	
Hypothesized Mean Difference	0.000	
df	*J*	
t Stat	7.397	
P(T<=t) one-tail	0.000	
t Critical one-tail	1.321	
P(T<=t) two-tail	0.000	
t Critical two-tail	1.717	

i. Identify the most appropriate statistical analysis for this study and justify your choice

(2 marks)

ii. Calculate the degree of freedom, ***J***.

(1 mark)

iii. Compare the calculated *t*-statistic with the *t*-critical two-tailed value. What decision should be made regarding the null hypothesis at $\alpha = 0.10$.

(3 marks)

(Total: 25 marks)

QUESTION 3

a. A quality control officer wants to determine whether there is a significant difference in the variability of product weight for plastic components produced by Mold A and Mold B. The data was analyzed using an F-test for independent samples.

Table 7

F-Test Two-Sample for Variances

	Mold A	*Mold B*
Mean	10.033	8.163
Variance	0.1020	0.0939
Observations	10	10
df	9	9
F	***W***	
P(F<=f) one-tail	0.4518	
F Critical one-tail	5.3511	

i. Identify which sample's variance should be placed in the numerator and which should be placed in the denominator of the F-ratio.

(2 marks)

ii. Calculate the value of ***W*** using the sample variances in Table 7.

(2 marks)

iii. Using the critical value approach, determine whether there is a significant difference in the variability of product weight for plastic components produced by Mold A and Mold B. Use $\alpha = 0.01$.

(3 marks)

b. A research team in a food technology laboratory is testing how different storage coatings affect the shelf life (days before moulding) of freshly baked bread. The coatings act similarly to preservatives but are made from natural ingredients. The three coatings tested are Coating A, Coating B and Coating C. The ANOVA summary output is shown in Table 8 and Table 9 using $\alpha = 0.05$.

Table 8

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Coating A	16	111	6.938	2.330
Coating B	16	107	***P***	3.163
Coating C	16	90	5.625	0.917

Table 9

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	***Q***	*2*	*7.77*	***T***	*0.034*	*3.2*
Within Groups	*96.125*	***R***	***S***			
Total		*47*				

i. Using the Sum of Squares Between Groups (SSB) formula, find ***Q***.

(3 marks)

ii. Determine the values of ***P, R, S*** and ***T***.

(8 marks)

iii. State the null and alternative hypotheses.

(2 marks)

iv. Based on the *p*-value in Table 9, test at the 5% level of significance whether there is a significant difference in the mean number of days before moulding among the three coatings.

(3 marks)

v. How much longer, on average, does bread using the best-performing coating last compared to the coating with the shortest shelf life?

(2 marks)

(Total: 25 marks)

QUESTION 4

a. In a classroom setting, students were asked to report their favourite school subjects. The collected data were analysed using a chi-square goodness-of-fit procedure to check whether the observed preferences show any significant deviation from the expected pattern. The analysis was performed at $\alpha = 0.10$, with the outputs shown in Tables 10 and 11.

Table 10

Subject	Observed
History	12
Music	10
English	15
Math	18
Science	25

Table 11

Pearson Chi-Square	***N***
p-value	0.0712
Critical value	7.779

i. Compute the test statistic for the Chi-Square Goodness-of-Fit, ***N***.

(6 marks)

ii. State the null and alternative hypotheses for the study.

(2 marks)

iii. Based on the *p*-value, determine whether there is a significant difference in preferences for various subjects at a 10% significance level.

(3 marks)

b. A health analyst is investigating whether there is an association between mask-wearing habits and the likelihood of catching a respiratory infection among 200 participants. Individuals were classified based on whether they regularly wear a mask (Yes, No) and whether they experienced respiratory symptoms (Symptoms, No Symptoms). The results are shown in Table 12 and the chi-square test results are displayed in Table 13.

Table 12

			Occurrence of Symptoms	
			Symptoms	No Symptoms
Mask-Wearing	Yes	Observed	25	35
		Expected	***A***	40.5
	No	Observed	40	100
		Expected	45.5	***D***

Table 13

Pearson Chi-Square	***M***
p-value	0.07
Critical value	3.841

i. Compute the values of ***A*** and ***D***.

(4 marks)

ii. Compute the test statistic, ***M***.

(5 marks)

iii. State the null and alternative hypotheses for this study.

(2 marks)

iv. Based on *p*-value, determine whether there is a significant relationship between mask-wearing habits and the occurrence of symptoms. ($\alpha = 0.05$)

(3 marks)

(Total: 25 marks)

(TOTAL: 100 MARKS)

END OF QUESTION PAPER

APPENDIX 1(1)

Index Numbers

i. Laspeyres Price Index = $\frac{\sum p_t q_0}{\sum p_0 q_0} \times 100$

ii. Paasche Price Index = $\frac{\sum p_t q_t}{\sum p_0 q_t} \times 100$

iii. Simple Aggregate Price Index = $\frac{\sum p_t}{\sum p_0} \times 100$

iv. Weighted Aggregate price Index = $\frac{\sum p_t w}{\sum p_0 w} \times 100$

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

w = weights

Confidence Intervals

i. Mean μ, for large samples

$\bar{x} \pm z\alpha/_2 \frac{\sigma}{\sqrt{n}}$ or $\bar{x} \pm z\alpha/_2 \frac{s}{\sqrt{n}}$

ii. Mean μ, for small samples

$\bar{x} \pm t\alpha/_2 \frac{s}{\sqrt{n}}$ $df = n - 1$

iii. Test statistic for two population mean, paired observation

$t = \frac{\bar{d} - 0}{\frac{s_d}{\sqrt{n}}}$

iv. Difference in means, $\mu_1 - \mu_2$, , for large and independent samples

$(\bar{x}_1 - \bar{x}_2) \pm z\alpha/_2 \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$ or $(\bar{x}_1 - \bar{x}_2) \pm z\alpha/_2 \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$

v. Difference in means, $\mu_1 - \mu_2$, , for small and independent samples

$(\bar{x}_1 - \bar{x}_2) \pm t\alpha/_2 s_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$ $df = n_1 + n_2 - 2$

vi. Difference in means, $\mu_1 - \mu_2 = \mu_d$ for paired samples

$\bar{d} \pm t\alpha/_2 \frac{s_d}{\sqrt{n}}$ $df = n - 1$

APPENDIX 1(2)

Analysis of Variance (ANOVA)

i. Degrees of freedom for the numerator = k – 1

ii. Degrees of freedom for the denominator = n – k

iii. Total sum of squares:

$$SST = \sum x^2 - \frac{(\sum x)^2}{n}$$

iv. Between-samples sum of squares:

$$SSB = \left(\frac{T_1^2}{n_1} + \frac{T_2^2}{n_2} + \frac{T_3^2}{n_3} + \cdots\right) - \frac{(\sum x)^2}{n}$$

v. Within-samples sum of squares = $SST - SSB$

vi. Test statistic for two sample for variances:

$$F = \frac{{s_1}^2}{{s_2}^2}$$

vii. Test statistic for a one-way ANOVA test:

$$F = \frac{MSB}{MSW}$$

Chi-square

i. Test statistic for Chi-square:

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

ii. $Expected\ value = \frac{row\ sum \times column\ sum}{grand\ total}$