Private & Confidential

BERJAYA BUSINESS SCHOOL

FINAL EXAMINATION

Student ID (in Figures)	:	
Student ID (in Words)	:	

Course Code & Name	:	**STA1314 BUSINESS STATISTICS**
Trimester & Year	:	January - April 2018
Lecturer/Examiner	:	Assoc. Prof. Dr. Chung Jee Fenn
Duration	:	2 Hours

INSTRUCTIONS TO CANDIDATES

1. **This question paper consists of 2 parts:**
   PART A (70 marks) : SEVEN (7) short answer questions. Answers are to be written in the Answer Booklet provided.
   PART B (30 marks) : TWO (2) long answer questions. Answers are to be written in the Answer Booklet provided.
2. **Candidates are NOT ALLOWED to bring any unauthorized materials EXCEPT non-programmable scientific calculator, geometrical set and writing equipment into the Examination Hall.**
3. **This question paper must be submitted along with all used and/or unused rough papers and/or graph paper (if any). Candidates are not allowed to take any examination materials out of the examination hall.**
4. **Only BLACK or BLUE ballpoint pens are allowed to be used in answering the questions, with the exception of graphical constructions/drawings, where 2B pencils are to be used.**

WARNING: The University Examination Board (UEB) of BERJAYA University College regards cheating as a most serious offence and will not hesitate to mete out the appropriate punitive actions according to the severity of the offence committed, and in accordance with the clauses stipulated in the Students' Handbook, up to and including expulsion from BERJAYA University College.

Total Number of pages = 6 (Including the cover page)

PART A : SHORT ANSWER QUESTIONS (70 MARKS)

INSTRUCTION : Answer **ALL** questions in the Answer Booklet(s) provided.

Question 1

Explain the DCOVA Framework of Statistics by Levine, Szabat & Stephan (2016).

(10 marks)

[Total: 10 marks]

Question 2

Below is set of data collected for the number of water supply interruptions per month in an industrial area in Shah Alam. All possible outcomes [probability *P*(x)] are included.

Never happen [*P(x)* = 0.35] Once [*P(x)* = 0.25] Twice [*P(x)* = 0.20]
Trice [*P(x)* = 0.10] 4 times [*P(x)* = 0.05] 5 times [*P(x)* = 0.05]

a. Organise the data by drawing a summary table of number of water supply interruptions per month.

(4 marks)

b. Draw a line graph of number of water supply interruptions per month (x) against the probability [*P*(x)] to represent the data. (*Please use the graph paper provided*)

(6 marks)

[Total: 10 marks]

Question 3

Marks	Frequency
20 – 29	4
30 – 39	10
40 – 49	12
50 – 59	11
60 – 69	7
70 – 79	5
80 – 89	1

Data above are marks obtained by a group of students in their Mathematics Test.

a. State the most common class of marks obtained by the students.

(1 mark)

b. Copy and complete the following table.

Marks	Lower Limit	Upper Limit	Frequency
20 – 29	19.5	29.5	4
30 – 39	29.5		10
40 – 49	39.5	49.5	12
50 – 59		59.5	11
60 – 69	59.5	69.5	7
70 – 79			5
80 – 89	79.5	89.5	1

(4 marks)

c. Use the table from (b), construct a Histogram to illustrate the distribution of marks obtained by this group of students. (*Please use the graph paper provided*)

(5 marks)

[Total: 10marks]

Question 4

The following data show the typical time it takes for James to get ready.

Day	1	2	3	4	5	6	7	8	9	10
Time (minutes)	39	29	43	52	39	44	40	31	44	35

a. Find the mode.

(2 marks)

b. Find the median.

(2 marks)

c. Calculate the mean time spent by James for him to get ready.

(3 marks)

d. Based on answer in (c), make a conclusion on the time spent by James to get himself ready.

(3 marks)

[Total: 10marks]

Question 5

The following table shows the scores obtained by Joanne in 30 attempts of a shooting game.

Score	0	1	2	3	4
Number of attempts	5	8	9	5	3

a. Determine the variance of the scores obtained.

(6 marks)

b. Fine the standard deviation.

(4 marks)

[Total: 10marks]

Question 6

The automated production line at ABC Cereals plant fills thousands of boxes of cereal during each shift. Boxes should contain a mean of 368 grams of cereal. Due to the speed of the process, the cereal weight varies from box to box. In order to overcome this inefficiency, the manager has randomly selected a sample of 25 boxes without replacement from the thousands of boxes filled during the shift. The sample contains a very small portion of the population. Given that the standard deviation (σ) of the cereal-filling process is 15 grams.

a. Compute the standard error of the mean ($\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$), and explain on the variations.

(4 marks)

b. Later, the manager increases the sample from 25 to 100 boxes. By calculating the new standard error of the mean, what conclusion is he likely to make on the variability in the sample means?

(6 marks)

[Total: 10marks]

Question 7

A simple linear regression was performed to ascertain a model-fit equation. The results are shown in tables below.

Regression	**Statistics**
Multiple R	0.9208
R^2	0.8479
Adjusted R^2	0.8352
Standard Error	0.9993
Observations	14.0000

ANOVA

	df	*SS*	*MS*	*F*	*Sig.*
Regression	1	66.845	66.785	66.879	0.000
Residual	12	11.983	0.998		
Total	13	78.768			

	Coefficients	*Standard Error*	*t stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-1.2068	0.9949	-1.2151	0.2477	-3.3765	0.9588
X	2.0742	0.2536	8.1780	0.0000	1.5216	2.6268

a. By using the formula of $\hat{Y}_i = b_0 + b_1 X_i$, compute a simple linear regression equation for the above case.

(4 marks)

b. Make an interpretation of the slope, b_1 and the *Y* intercept, b_0 on the predicted mean value of *Y*.

(6 marks)

[Total: 10marks]

END OF PART A

PART B **: LONG ANSWER QUESTIONS (30 MARKS)**

INSTRUCTION(S) **:** Answer **ALL** questions in the Answer Booklet(s) provided.

Question 1

A professor wants to use the number of hours a student studies for a statistics final exam (*X*) to predict the final exam score (*Y*). A regression model is fit based on data collected from his class during the previous semester, with the following results:

$$\hat{Y}_i = 35.0 + 3X_i$$

If you are the professor, write a comprehensive interpretation on the *Y* intercept, b_0 and the slope, b_1. Make a conclusion based on your interpretation. Lastly, provide a suggestion to your students so that they can perform better in their future examinations.

(15 marks)

Question 2

You are the manager of a fast-food restaurant. The business problem is to determine whether the population mean (μ) waiting time to place order had changed in the past month from its previous population mean value (μ) of 4.5 minutes. From past experience, you can assume that the population standard deviation is 1.2 minutes and the population waiting time is normally distributed. You select a sample of 25 orders during a one-hour period. The sample mean is 5.1 minutes. Your calculation of the *p*-value for this two-tail test is 0.0124.

Based on the information above, you would need to write a null hypothesis (Ho_1) that the population mean (μ) has not changed from its previous value of 4.5 minutes; the alternative hypothesis (Ha_1); using the *p*-value approach, explain whether or not you reject the null hypothesis (Ho_1) and make a conclusion of your hypothesis testing.

(15 marks)

END OF EXAM PAPER

List of Formulae

Statistics

Measure of Central Tendency

	Ungrouped Data	Grouped Data	
		Without Class Interval	With Class Interval
Mean	$\bar{x} = \frac{\Sigma x}{N}$ $\bar{x}$ = mean Σx = sum of x x = value of the data N = total number of the data	$\bar{x} = \frac{\Sigma fx}{\Sigma f}$ $\bar{x}$ = mean Σx = sum of x f = frequency x = value of the data	$\bar{x} = \frac{\Sigma fx}{\Sigma f}$ $\bar{x}$ = mean f = frequency x = class mark $= \frac{\text{(lower limit+upper limit)}}{2}$
Median	$m = T_{\frac{N+1}{2}}$ When N is an odd number. $m = \frac{T_{\frac{N}{2}} + T_{\frac{N}{2}+1}}{2}$ When N is an even number.	$m = T_{\frac{N+1}{2}}$ When N is an odd number. $m = \frac{T_{\frac{N}{2}} + T_{\frac{N}{2}+1}}{2}$ When N is an even number.	$m = L + \left(\frac{\frac{1}{2}N - F}{f_m}\right)C$ m = median L = Lower boundary of median class N = Number of data F = Total frequency before median class f_m = Total frequency in median class c = Size class = (Upper boundary – lower boundary)

Measure of Dispersion

	Ungrouped Data	Grouped Data	
		Without Class Interval	With Class Interval
variance	$\sigma^2 = \frac{\sum x^2}{N} - \bar{x}^2$	$\sigma^2 = \frac{\sum fx^2}{\sum f} - \bar{x}^2$	$\sigma^2 = \frac{\sum fx^2}{\sum f} - \bar{x}^2$
Standard Deviation	$\sigma = \sqrt{\text{variance}}$ $\sigma = \sqrt{\frac{\Sigma(x-\bar{x})^2}{N}}$ $\sigma = \sqrt{\frac{\Sigma x^2}{N} - \bar{x}^2}$	$\sigma = \sqrt{\text{variance}}$ $\sigma = \sqrt{\frac{\Sigma(x-\bar{x})^2}{N}}$ $\sigma = \sqrt{\frac{\Sigma x^2}{N} - \bar{x}^2}$	$\sigma = \sqrt{\text{variance}}$ $\sigma = \sqrt{\frac{\Sigma f(x-\bar{x})^2}{\Sigma f}}$ $\sigma = \sqrt{\frac{\Sigma fx^2}{\Sigma f} - \bar{x}^2}$