



Family Name					
Given Name/s					
Student Number					
Teaching Period	Semester 2 Special/Summer, 2018				

STA510 – Business Statistics	DURATION	
	Reading Time:	10 minutes
	Writing Time:	180 minutes
INSTRUCTIONS TO CANDIDATES		
Section A: 20 Multiple Choice Questions	Marks: 10	Time Suggested: 50 minutes
Section B: 3 Short Answer Questions	Marks: 10	Time Suggested: 90 minutes
Section C: 1 Structured Question	Marks: 10	Time Suggested: 40 minutes
EXAM CONDITIONS		
<u>You may begin writing from the commencement of the examination session.</u> The reading time indicated above is provided as a guide only.		
This is a RESTRICTED OPEN BOOK examination		
Any non-programmable calculator is permitted		
No handwritten notes are permitted		
Any hard copy, unannotated English dictionary is permitted		
ADDITIONAL AUTHORISED MATERIALS	EXAMINATION MATERIALS TO BE SUPPLIED	
No additional printed material is permitted	1 x 20 Page Book 1 x 5-Multiple Choice Answer Sheet 1 x Scrap Paper Formula Sheet/s Statistical Table/s	

**THIS EXAMINATION IS PRINTED
DOUBLE-SIDED.**

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Section B
Short Answer Questions
Total Marks for this section: 30

This section should be answered in the Answer Booklet provided. You are required to answer any **THREE** out of **FOUR** questions. Each question is worth **10 marks**.

Suggested Time allocation for Section B: 90 minutes

Question 1

Part A (5 marks)

A sample of shoppers at Casuarina shopping centre, which is regarded as the Territory's largest shopping centre, at Darwin City was asked the following questions. Identify the type of data each question would produce.

- (i) What is your age? (Marks: 1)
- (ii) How much did you spend? (Marks: 1)
- (iii) What is your marital status? (Marks: 1)
- (iv) Rate the availability of parking excellent, good, fair or poor. (Marks: 1)
- (v) How many stores did you visit? (Marks: 1)

Part B (5 marks)

The number of hours spent studying during the final exam week in a College was recorded as follows:

3 7 12 14 15 15 17 20 23 24

- (i) Calculate the mean of the sample data. (Marks: 1)
- (ii) Calculate the median of the sample data. (Marks: 1)
- (iii) Calculate the standard deviation of the sample data. (Marks: 2)
- (iv) Calculate the coefficient of variation. (Marks: 1)

Question 2 (10 marks)

The quality control manager at a light bulb factory needs to estimate the mean life of a large shipment of light bulbs. The population standard deviation of light bulb production process is known to be 100 hours. A random sample of 64 light bulbs indicated a sample mean life of 350 hours.

(a) Write down the parameter of interest, its point estimator and the associated sampling distribution which could be used for the estimation of the confidence interval. Provide a brief explanation.

(Marks: 3)

(b) Specify the formula for 90% confidence interval estimator of the parameter.

(Marks: 1)

(c) Perform the necessary calculations and write down the lower and upper limits of the 90% confidence interval.

(Marks: 3)

(d) Interpret the confidence interval.

(Marks: 1)

(e) Do you think that the manufacturer has the right to state that the light bulbs produced in his factory last an average life of 400 hours? Explain.

(Marks: 2)

Question 3 (10 marks)

The starting salary of Bachelor of Commerce graduates in Australia is known to be normally distributed. An Australian university claims that the average starting salary of its graduates has increased since 2014. The average salary in 2014 was \$55,000. A sample of 36 graduates were chosen from the batch of 2017. The average salary and the standard deviation in the sample was found to be \$56,900 and \$6,000 respectively. A prospective student wishes to investigate the University's claim at 1% level of significance.

(a) State the null and alternative hypotheses to be tested.

(Marks: 1)

(b) Which test statistic should be used to test the hypothesis? Clearly state the conditions that need to be satisfied to use your test statistic.

(Marks: 3)

(c) Derive the decision rule that should be used in the hypothesis test. (Marks: 1)

(d) Compute the test statistic for the hypothesis test. (Marks: 3)

(e) Is the University's claim true? Why? Why not? Discuss. (Marks: 2)

Question 4 (10 marks)

Part A (5 marks)

Let X denote the number of pizzas delivered by Jim every night. The following table gives us the probability distribution of X .

x	2	3	4	5
p(x)	0.2	0.4	0.3	0.1

(i) Find $P(X \leq 3.5)$. (Marks: 1)

(ii) Find $P(X > 2)$. (Marks: 1)

(iii) Find the mean and the variance of X . (Marks: 2)

(iv) Jim gets a fixed payment of \$15 every night from the Pizza shop he works for. In addition, he gets \$2 for every pizza he delivers. What is expected value of payment received by Jim every night? (Marks: 1)

Part B (5 marks)

Suppose that a new toy car is designed so that its lifetime (in months) is normally distributed with mean 18 months and standard deviation 4 months.

(i) The manufacturer has decided to use a marketing strategy in which the car is covered by warranty for 12 months. What is the probability that a car will stop working **before** the warranty expires? (Marks: 2)

(ii) Suppose that the manufacturer now decides to extend the warranty to 16 months. What is the probability that a car will continue working **after** the new warranty expires? (Marks: 3)

Section C
Structured Question
Total Marks for this section: 10

This section should be answered in the Answer Booklet provided.
Suggested Time allocation for Section C: 40 minutes

Question 1 (10 marks)

The average house price in Baycoast is 6 (measured in hundred thousand dollars) but it also has considerable variability. The management of a real estate agency is interested in the relationship between “street ratings” (x) and selling price of houses (y) in the local area. Street ratings range between 0 (lowest appeal) to 10 (highest appeal).

They ask you (a senior manager of the agency) to investigate this relationship. You choose a random sample of 40 houses. A regression analysis of y against x using Excel yielded the output below:

SUMMARY OUTPUT						
<i>Regression Statistics</i>						
Multiple R	0.9378					
R Square	0.8795					
Adjusted R Square	0.8764					
Standard Error	0.9602					
Observations	40					
<i>ANOVA</i>						
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression	1	255.7479	255.7479	277.4148	0.0000	
Residual	38	35.0321	0.9219			
Total	39	290.7800				
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	1.4846	0.3280	4.5269	0.0001	0.8207	2.1485
Street Rating	0.8803	0.0529	16.6558	0.0000	0.7733	0.9873

Use the Excel results above to answer the following questions:

- (a) Write down the estimated regression line ($\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x$). (Marks: 1)
- (b) Interpret the intercept term ($\hat{\beta}_0$) and the slope coefficient ($\hat{\beta}_1$) of the regression line. (Marks: 2)
- (c) What is the predicted house price with a street rating of 7?

(Marks: 1)

(d) Using the six-step hypothesis testing procedure test whether there is a linear relationship (slope coefficient is different from 0) between street ratings and house prices at 5% level of significance. (Use Excel output for your test)

(Marks: 4)

(e) Find the coefficient of determination (R^2) and interpret it.

(Marks: 2)

END OF EXAMINATION