NATIONAL UNIVERSITY OF SINGAPORE

School of Computing

BT1101 – INTRODUCTION TO BUSINESS ANALYTICS

(Semester 1: AY2016/17)

Time Allowed : 2 Hours

INSTRUCTIONS TO STUDENTS

1. Please write your Student Number only. Do not write your name.
2. This assessment paper contains **TWO (2)** sections and comprises **Fourteen (14)** printed pages, including this page. Section 1 contains **TWENTY-SIX (26)** multiple choice questions. Section 2 contains **Six (6)** structured questions.
3. Use the provided **OCR Form** for **Section 1**.
4. Answer **ALL** questions within the space in this booklet for **Section 2**.
5. This is a **CLOSED BOOK** assessment.

STUDENT NO: _____

This portion is for examiner's use only

Question	Marks	Remarks
Section 1		
Section 2		
Total		

Section 2: Short Answer Questions (6 × 2 Mark = 12 Marks)

Q27. On studying the database, the manufacturer found that the average difference between the estimated and actual total costs was $394. Based on the sample data, can the manufacturer conclude that the average difference between the estimated and actual total costs is different from zero?

Write down your null and alternative hypotheses. Based on the following results, test your null hypothesis and interpret the result. Use alpha = 0.05.

	Estimated Total Cost	Actual Total Cost
Mean	4500	4894
Variance	0	31915.55556
Observation	10	10
df	9	
t Stat	-6.97	
P(T<=t) one-tail	0	
t Critical one-tail	1.83	
P(T<=t) two-tail	0.0001	
t Critical two-tail	2.26	

Q28. NUH Trauma Center had 3,132 patients admitted between the years 1991 and 1994. For each patient, the attending physician recorded their age, their revised trauma score (RTS), their injury severity score (ISS), whether their injuries were blunt (i.e., the result of a car crash: BP=0) or penetrating (i.e., gunshot wounds: BP=1), and whether they eventually survived their injuries (DEATH = 1 if died, DEATH = 0 if survived). Approximately 9% of patients admitted to the NUH Trauma Center eventually die from their injuries. The logistic regression results are given below.

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------------------------------------------------------------------------------
     death |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------+------------------------------------------------------------------
       iss |   .0651794   .0071603     9.10   0.000     .0511455    .0792134
        bp |   1.001637    .227546     4.40   0.000     .5556555    1.447619
       rts |  -.8126968   .0537066   -15.13   0.000    -.9179597   -.7074339
       age |    .048616   .0052318     9.29   0.000     .0383619      .05887
     _cons |  -.5956074    .4344001    -1.37   0.170    -1.447016    .2558011
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State the fitted logistic model. Briefly explain what odds ratio represents and discuss the estimated coefficients of ISS, BP and RTS with the odds ratio.

Q29. Clementi musical instrument retail has 10,000 point-of-sale transactions, out of which 1500 sales included both items of electric guitars and guitar cases, and out of which 750 had sales of new strings. If the electric guitars are considered A, the guitar cases are considered B, and the strings are considered C, then the association rule for these sales become "If A and B are purchased, then C is also purchased."

Calculate the confidence level, and lift for this rule, given that total transactions for C is 3000. Then, discuss the strength of the association rule measured.

Q30. Discuss the purpose of classification methods with an example algorithm. Then, briefly explain the steps of classification and how to measure classification performance.

[Questions 31-32] A portfolio manager at Clementi Investment has $2,500 of available funds and has identified three potential stocks in which to invest. The cost per share and expected return over the next 2 years is given below.

Stock	A	B	C
Price/share	$25	$15	$30
Return/share	$8	$7	$11

Q31. Mathematically formulate a linear optimization model. That is, outline your objective function and all the constraints in the form of equality/inequality.

Q32. Suppose that you obtained the following solutions and the sensitivity report output from your model in Q31.

Objective Cell (Max)

Cell	Name	Original Value	Final Value
A16	TOTAL RETURN	$1,166.67	$1,166.67

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
B10	Shares Purchased A	0	-3.666666667	8	3.666666667	1E+30
C10	Shares Purchased B	166.6666667	0	7	1E+30	1.5
D10	Shares Purchased C	0	-3	11	3	1E+30

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
E13	Investment Limit	2500	0.466666667	2500	1E+30	2500

Briefly discuss what the shadow price refers to and explain the value of shadow price for the total investment constraint. If the client could borrow $1,000 at 8% a year to increase her total investment, what would you recommend? Provide your justification. Continue your answer on the next (blank) page, if necessary.

End of Paper