UNIVERSITY OF SWAZILAND

FACULTY OF SOCIAL SCIENCE

DEPARTMENT OF ECONOMICS

RE-SIT/ SUPPLEMENTARY EXAMINATION

JULY 2018

TITLE OF PAPER: MATHEMATICS FOR ECONOMICS

COURSE CODE: ECO206/ ECON209

TIME ALLOWED: 2 HOURS

INSTRUCTIONS: ANSWER ANY THREE QUESTIONS.

QUESTION 1

(a) A web-based travel agency uses its website to market its travel products (holiday packages). The agency receives an average of five web-based enquiries per day for its different travel products.

(i) What is the probability that, on a given day, the agency will receive only three web based enquiries for its travel products? [1]

(ii) What is the probability that, on a given day, the travel agency will receive at most two web-based enquiries for travel packages? [2]

(iii) What is the probability that the travel agency will receive more than four web-based enquiries for travel packages on a given day? [3]

(iii) What is the probability that the travel agency will receive more than four web-based enquiries for travel packages in any two-day period? [4]

(b) Global Insurance has found that 20% (one in five) of all insurance policies are surrendered (cashed in) before their maturity date. Assume that 10 policies are randomly selected from the company's policy database.

(i) What is the probability that four of these 10 insurance policies will have been surrendered before their maturity date? [2]

(ii) What is the probability that no more than three of these 10 insurance policies will have been surrendered before their maturity date? [4]

(iii) What is the probability that at least two out of the 10 randomly selected policies will be surrendered before their maturity date? [4]

Question 2

(a) Jed Home Stores analysed the value of purchases made on credit card by a random sample of 25 of their credit card customers. The sample mean was found to be R170, with a sample standard deviation of R22.

(i) Estimate, with 95% confidence, the actual mean value of credit card purchases by all their credit card customers. [5]

(ii) Assume that 46 credit card purchases were sampled. Set 95% confidence limits for the actual mean value of credit card purchases at this home store (σ is unknown). [5]

(b) What are the assumptions of ANOVA [3]

(c) What is the objective of ANOVA, provide a clear rationale [7]

Question 3

PQ Printers is evaluating the delivery time of two courier delivery services in Johannesburg. Their initial belief is that there is no difference between the average delivery times of the two courier services.

To examine this view, PQ Printers used both courier services daily on a random basis over a period of three months for deliveries to similar destinations. A dispatch clerk in the marketing department recorded delivery times. Courier A was used 60 times over this period and the sample mean delivery time was 42 minutes. Courier B was used 48 times over the same period and their sample mean delivery time was 38 minutes. Assume that the population standard deviation of delivery times for courier A is 14 minutes, and for courier B assume it is 10 minutes. Also assume that delivery times are normally distributed.

(i) PQ Printers wishes to sign a one-year contract with one of the courier companies after this trial period. Test the hypothesis, at the 5% level of significance, that there is no difference between the mean delivery times of the two couriers. [10]

(ii) PQ Printers would like to know whether courier A is slower, on average, than courier B in its delivery times to clients. Test statistically, at the 5% level of significance, whether courier A's mean delivery time is longer than (i.e. greater than) courier B's mean delivery time. [10]

Question 4

The Abacus Media Company publishes three magazines for the teenage market (male and female readers between 13 and 16 years of age). The management question, which the executive editor of Abacus would like to answer, is the following: 'Are readership preferences for the three magazines independent of gender?' A survey was carried out amongst 200 teenagers (of both genders and between the ages of 13 and 16 years) in various bookstores. Randomly selected teenagers who bought at least one of the three

magazines were interviewed and asked the following question: 'Which one of these three magazines do you most prefer to read?' The gender of the respondent was also noted.

	Magazine			
Gender	Beat	Youth	Grow	Total
Male	13	28	39	80
Female	33	45	42	120
Total	46	73	81	200

The sample profile shows that 80 girls and 120 boys were interviewed (column total), and that 46 teenagers prefer Beat; 73 prefer Youth and 81 prefer Grow (row total). The Table also shows the observed joint frequency count for each combination of gender and magazine preference (e.g. 33 boys most prefer Beat magazine, and 28 girls most prefer Youth magazine).

(a) Are readership preferences for the three magazines independent of gender? Test, at the 5% level of significance, whether there is a statistical association between gender and magazine preference (i.e. whether or not they are statistically independent).

[20]