Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Science and Technology
200 level 2nd Semester Examination – Jan. /Feb. 2016
SCT 202-2 Statistical Methods

Uva Wellassa University

Part C

Instructions to candidates
Duration: 45 minutes
Number of questions: Three (03) essay questions
Mark allocation: 40
Answer All Questions.
Scientific Calculators are allowed.

1. Suppose a certain drug test is 99% sensitive and 99% specific, that is, the test will correctly identify a drug user as testing positive 99% of the time, and will correctly identify a non-user as testing negative 99% of the time. This would seem to be a relatively accurate test, but Bayes' theorem can be used to demonstrate the relatively high probability of misclassifying non-users as users. Let's assume a corporation decides to test its employees for drug use, and that only 0.5% of the employees actually use the drug. What is the probability that, given a positive drug test, an employee is actually a drug user?

(10 mark)

2. People who get angry easily tend to be more likely to have heart disease. That is the conclusion of a study that followed a random sample of 12,986 people from three locations over about four years. All subjects were free of heart disease at the beginning of the study. The subjects took the Spielberger Trait Anger Scale, which measures how prone a person is to sudden anger. The 8474 people in the sample who had normal blood pressure were classified according to whether they had "coronary heart disease" (CHD) or not and whether they had low anger, moderate anger, or high anger according to the Anger Scale. The classification summary is given.

	Low Anger	Moderate Anger	High Anger
CHD	53	110	27
No CHD	3057	4621	606

Task: Perform a suitable test of independence at the 10% level to assess if Anger classification and Heart Disease Status are related.

(10 mark)

22

3. An experiment was conducted to compare 3 brands of gasoline. Each brand was used with 7 different cars of the same weight and engine size, under similar operating conditions. The data collected were the miles per gallon obtain for each of the cars.

Brand A: 19 24 24 21 20 22 25
Brand B: 25 26 34 25 24 24 23
Brand C: 25 31 28 29 28 30 28

a. Identify the most suitable experimental design for this experiment giving justifications. (2 mark)
b. What is the model that you will use? (3 mark)
c. What is (are) the main assumption(s) under the ANOVA and mention appropriate tests to check the validity of assumptions? (6 mark)
d. Construct the complete ANOVA table and interpret the results in ANOVA table with suitable hypothesis. (Suppose that in usual notation, SSE = 135.43, and SSTol = 275.24 (5 mark)
e. What are the advantages and disadvantages of the experimental design you proposed? (4 mark)