

DEPARTMENT OF DEMOGRAPHY AND SOCIAL STATISTICS

FACULTY OF SOCIAL SCIENCES

OBAFEMI AWOLowo UNIVERSITY, ILE-IFE, NIGERIA

Name of Examination: Harmattan Semester Examination (2010/2011)
Course Code: DSS 405
Course Title: Advanced Social Statistics I
Instruction: Answer all questions
Time Allowed: 2 hours

QUESTION 1

In a certain university, students may choose a 3-semester-hour course in Physics without labs and a 4-semester-hour course with labs. The final written examination is the same for each section. 12 students in the section with labs made an average examination grade of 84 with a standard deviation of 4 and 18 students in the section without labs made an average grade of 77 with a standard deviation of 6.

- (i) Find a 99% confidence interval for the difference between the average grades for the two courses, assuming the populations to be approximately normally distributed with equal variances
- (ii) Is the grade of students in the first section significantly higher than that of students in the second section? Use $\alpha=0.05$

QUESTION 2

- (a) 40% of all women using modern contraceptives in Ajilete community use the pill, 30% use IUD and the remaining 30% use diaphragm. If 3 women are selected at random, what is the joint probability function for (X, Y) , where X represents number of women in the community using the pill and Y represents those using IUD?
- (b) Find the expected value of the random variable whose probability density is given

$$f(x) = \frac{(x+1)}{8}$$

$2 < x < 4$ and 0 elsewhere

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QUESTION 3

- (a) Given that the density function for a random variable Z is $f(x) = 3(z-4)/5; 1 < z < 3$ and 0 elsewhere. Compute (i) variance (ii) standard deviation
- (b) State whether $f(x, y) = 9x^2 y^2 \quad 0 \leq x \leq 1, 0 \leq y \leq 1$, is a statistically independent joint probability function.
- (c) Given $f(m, u) = 24u(1-m) \quad 0 \leq m \leq 1, 0 \leq u \leq m$, find (i) $f(m/u)$ (ii) $f(u/m)$

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QUESTION 4

Prior to conducting a clinical trial that involves a subjective evaluation of a patient's progress, the participating physicians are asked to agree on certain criteria for reaching an evaluation. To examine the consistency in their evaluations before the initiation of a particular clinical trial, a pilot study was conducted on 4 patients who had been treated with a drug that was to be included in the trial. Each of the 5 physicians who were to participate in the study was asked to evaluate (on a 0-to-10-point scale) the degree of cure after a two-week treatment period. Since the clinical evaluations of a patient's cure were to be based on the results of a bacteria culture analysis, each physician analyzed 2 cultures from each patient. This feature was unknown to the physicians, who were merely told they would be analyzing 8 separate bacteria cultures. The evaluations based on these cultures are as shown below.

Physician	Patient			
	A	B	C	D
Dr. Opeyemi Ikuteyijo	7.2, 9.6	4.2, 3.5	9.5, 9.3	5.4, 3.9
Dr. Sakiru Adebayo	8.5, 9.6	2.9, 3.3	8.8, 9.2	6.3, 6.0
Dr. Adebayo Dorcas	9.1, 8.6	1.8, 2.4	7.6, 7.1	6.1, 5.6
Dr. Mustapha Abdulahi	8.2, 9.0	3.6, 4.4	7.3, 7.0	5.0, 5.4
Dr. Musa-Terere	7.8, 3.7	3.7, 3.9	9.2, 8.3	6.5, 6.9

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- a. How many variables are involved in the experiment? (1 mark)
- b. Determine the response variable(s) (1 mark)
- c. Determine the explanatory variable(s) (1 marks)
- d. Determine the total number of cultures analyzed by Dr. Musa-Terere (1 mark)
- e. Using appropriate statistical technique, draw your conclusions at 0.05 level of significance. (16 marks)

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