

**JARAMOGI OGIGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY  
SCHOOL OF HEALTH SCIENCES  
MPH EXAMINATION**

**END SEMESTER EXAMINATION  
HMP 5136: STATISTICAL METHODS IN EPIDEMIOLOGY**

**April 2014**

**TIME ALLOWED: 2 hours 30 minutes.**

**Note: Answer question one and any other three questions**

**QUESTION 1 (COMPULSORY)**

- a) List four (4) properties of correlation coefficients **(4 Marks)**
- b) Name the most convenient way of accessing the relationship between two numeric variables **(2 Marks)**
- c) State two (2) characteristics of Binomial distribution **(2 Marks)**
- d) List four (4) requirements to determine sample size **(4 Marks)**
- e) List three (3) important assumptions for simple linear regression **(3 Marks)**

**QUESTION 2**

- a) Differentiate between significance test and confidence interval **(3 Marks)**
- b) List three (3) reasons for fitting a multiple regression instead of a simple regression model **(3 Marks)**
- c) Distinguish between:
  - i. type I and type II errors **(2 Mark)**
  - ii. Pearson and spearman rank correlation **(2 Mark)**
- d) Given measurements on a sample, what is the difference between standard deviation and standard error **(3 Marks)**

- e) Name the method used in estimating logistic regression coefficients (2 Mark)

### **QUESTION 3**

- a. Sketch a graph showing no correlation between two variables but are dependent (2 Marks)
- b. List three (3) reasons why researchers prefer to study a sample of a population (3 Mark)
- c. Name two (2) properties of Poisson distribution (2 Marks)
- d. A survey was carried out in Kisii to compare haemoglobin (Hb) levels in boys and girls. The Hb levels were measured in 143 girls and 127 boys in town. Girls had a mean Hb level of 11.2 with a standard deviation of 1.4. While boys had a mean Hb level of 11.0 with a standard deviation of 1.3
- i. List three (3) possible interpretations of the above results (3 Marks)
- ii. Determine whether the difference in Hb levels in girls and boys is due to change or likely to be a real effect (5 Marks)

### **QUESTION 4**

- a. Define Mc-Nemar's test (2 Marks)
- b. An experiment was set up in which 50 specimens of sputum were each cultured on the two different media. The results indicated that 25 were positive in both media A and B. 12 were positive in media A only, 3 positive in media B only. The remaining 10 were negative in both A and B media.
- i. Construct a 2 x 2 contingency table (4 Marks)
- ii. State the alternative hypothesis (2 Marks)
- iii. Test the difference between the two media (7 Marks)

Note: the tabulated value of the test= 1.23

### **QUESTION 5**

- a. Differentiate between logistic and linear regression (3 Marks)
- b. List five (5) properties of normal distribution (5 Marks)
- c. A group of surgeons wanted to conduct a trial on a new antibiotic whether it is effective in preventing gram-negative infections. Suppose they want to detect a

reduction in the proportion that had infection (shock) from 10% to 5% or less and they are willing to tolerate a type 1 error of 5% and a 95% power. What sample size should he use to achieve the above goal (7 Marks)

**QUESTION 6**

- a) A researcher examines the relationship between systolic pressure and height for the participants he is following. The data were analyzed with the following results

Source	SS	df	MS	
Model	5063.49	1	?	Number of obs = ?
Residual	?	?	?	F (1, 8) =?
Total	11534.16	9		Prob > F = 0.07
				R-squared =?
				Adj R-squared = 0.899

  

Variable	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
Height	-3.0	1.2	-2.5	0.04	?
Constant	60.0	25.6	2.34	0.025	?

- i. Describe the relationship between blood pressure and height (2 mark)
- ii. What is the equation that has been fitted to the data (2 Marks)
- iii. Is the relationship statistically significant? Justify your answer (2 Marks)
- iv. Complete the Analysis of Variance table (7 Marks)
- v. Comment on the value of R squared (2 Marks)