JARAMOGI OGIGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF HEALTH SCIENCES
MPH EXAMINATION
(KISII LEARNING CENTER)

END SEMESTER EXAMINATION
HMP 5136: STATISTICAL METHODS IN EPIDEMILOGY

August 2013

TIME ALLOWED: 2 hours 30 minutes.

Note: Answer question one and any other three questions

QUESTION 1 (COMPULSORY)

a)   State whether the following outcome variables can be analyzed using logistic or linear regression **(5 Marks)**

    (i)   HIV status
    (ii)   Blood pressure
    (iii)   Anemia
    (iv)   Hemoglobin
    (v)   Lung cancer

b) Distinguish between:

    i.   Binomial and Bernoulli distribution **(2 Marks)**

    ii. Confidence interval and P-value **(2 Marks)**

    iii. Sample mean and population mean **(2 Marks)**

    iv. Simple and multiple logistic regression (**2 Marks**)

c) Name the most convenient way of accessing the relationship between two numeric variables (**2 Marks**)

QUESTION 2

a) Define Poisson distribution (**2 Marks**)
b) State six (6) main procedures of testing hypothesis (**6 Marks**)

c) State two components of total variation under inference from linear regression (**2 Marks**)

d) Differentiate between student-t and analysis of variance (**2 Mark**)

e) Name two approaches in interpreting results from logistic regression output (**3 Marks**)

QUESTION 3

a. What is correlation coefficient (**3 Marks**)

b. State four (4) properties of correlation coefficients (**4 Mark**)

c. Differentiate between correlation and regression (**2 Marks**)

d. Assume that the sum of squares of blood pressure is 8166.67, sum of squares of age is 11256 and sum of products about the mean for blood pressure and age is 9107.

    i. Calculate the Pearson's correlation coefficient (**4 Marks**)

    ii. Comment on the results obtained in b(i) above (**2 Marks**)

QUESTION 4

a. State two (2) properties of Binomial distribution (**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 20 were positive in both media A and B. 12 were positive in media A only, 2 positive in media B only. The remaining 16 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) requirements for sample size calculation (**5 Marks**)

c. An investigator wanted to access whether health education can increase compliance rate with home management of malaria. Initial compliance is 40%. Suppose he want to detect an improvement of 25%. The investigator is willing to tolerate type I error of 2% and a 90% power. What sample size should he use to achieve the above goal (**7 Marks**)

QUESTION 6

e. A researcher examines the relationship between systolic pressure and weight for the participants he is following. The data were analyzed with the following results

```
Source  |  SS         df       MS                      Number of obs = 30
--------------------------------------------            F (1, 28) =?
Model   | 7368.10      1        ?                        Prob > F = 0.000
Residual| 798.58       ?        ?                        R-squared  =?
--------------------------------------------            Adj R-squared = 0.899
Total   |   ?          29
```

```
---------------------------------------------------------------------------
Variable |  Coef.    Std. Err.   t      P>|t|    [95% Conf. Interval]
---------------------------------------------------------------------------
Weight   | 0.809     0.050      16.07   0.00          ?
Constant| 19.246     6.631      2.90    0.007         ?
---------------------------------------------------------------------------
```

   i. Describe the relationship between blood pressure and weight (**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 (**9 Marks**)