Indian Statistical Institute, Bangalore
B. Math (III)
Second Semester 2016-2017
Semester Examination : Statistics (IV)

Date: 04-05-2017   **Maximum Score 50**   **Duration: 3 Hours**

1. Develop Mann Whitney U Test for testing the equality of the two distribution functions. Show that the test is consistent.

[12]

2. Define odds ratio. Build a test for testing the hypothesis odds ratio $= 1$ against the two sided alternative.

[10]

3. For a two way contingency table explain the framework and build a test for testing the independence of the two classifying variables.

[10]

4. Explain the notion of generalized linear models (GLM). Consider the GLM framework where there is one explanatory variable, the response is a count variable with Poisson distribution and we use the loglink. Build a test for $\beta = 0$ versus $\beta \neq 0$.

[10]

5. Explain how the logistic regression model is a member of the generalized linear models (GLM) family. Derive maximum likelihood estimators for the parameters of the logistic regression model and explain how to carry out likelihood ratio test for testing the hypothesis $H_0 : \beta = 0$. Explain the use of deviance for comparing model M say, with the saturated model for a GLM.

[15]