



DEPARTMENT OF STATISTICS AND DATA
SCIENCE

Jahangirnagar University
Take-home Exam-2
Subject: Applied Regression

Course No. 307
Time: 15 days
Full Marks: 20

1. Refer to the data file **Question2** in attached file. The response is the number of emergency room visits (variable 7) and the pool of potential predictor variables includes total cost, age, gender, number of interventions, number of drugs, number of complications, number of comorbidities, and duration (variables 2 through 6 and 8 through 10).

Table 1: Ischemic heart disease data set

X1	X2	X3	X4	X5	X6	X7	X8	X9	X10
1	179.1	63	0	2	1	4	0	3	300
2	319.0	59	0	2	0	6	0	0	120
3	9310.7	62	0	17	0	2	0	5	353
...
...
...
788	586	56	0	4	4	6	0	3	336

- (a). Obtain the fitted the Poisson regression model with the response function $\mu_i = \exp(X'\beta)$. State the estimated regression coefficients, their estimated standard deviations, and the estimated response function.
- (b). Obtain the deviance residuals and plot them against the estimated model probabilities with a lowess smooth superimposed. What does the plot suggest about the adequacy of the fit of the Poisson regression model?
- (c). Conduct a series of Wald tests to determine which predictor, if any, can be dropped from the regression model!. Control α at 0.01 for each test. State the alternatives decision rules, and conclusions.
- (d). Assuming that the fitted model in part (a) is appropriate, use the likelihood ratio test and determine whether duration, complications, and comorbidities can be dropped from the model: control α at 0.05. State the full and reduced models, decision rule, and conclusion.
- (e). Use backward elimination to decide which predictor variables can be dropped from the regression model. Control the α risk at 0.10 each stage. Which variables are retained?