APPLIED REGRESSION **Sample Test-3** **SPRING**

Name: _____ **Instructor: D. Kushary**

1. The data (sheet=Logistic) represents the test firing results for 25 surface-to-air anti-aircraft missiles at targets of varying speed (in knots). The results of each test is either a hit (Y=1) or a miss (Y=0).

   (a) Fit a logistic regression model to the response variable Y and write down the estimated model. Use a simple linear regression model as the structure of the linear predictor.

   (b) Find a 98% confidence interval for the odds ratio when speed goes up by 50 (knots)

   (c) Does the model deviance indicate that the above model is adequate at 10% level?

   (d) Expand the linear predictor to include a quadratic term in the Target speed. Is there any evidence that this quadratic term is required in the model. Use 5% significance level.

2. Do average automobile insurance costs differ for different insurance companies? One of the other variables which determines the cost is location. To test the theory, estimates (in dollars) are taken for a fixed type of drivers from 3 insurance companies (1-State Farm 2-Allstate 3-AAA). Each of the three companies provided estimates for four different cities(A-Riverside, B-San Bernadino, C-Hollywood and D-Long Beach). Data was analyzed using two-way ANOVA model without interaction and one observation per cell. The following summary statistic are available. SST=86, SS(Location)=42 and F-Stat(Location) = 7. Total for each of the companies are $T_1 = 100, T_2 = 324, T_3 = 196$.

   (a) Write down the model, factor and levels for the problem.

   (b) Complete the ANOVA table and test if there is sufficient evidence to indicate that average insurance premiums differ from company to company at 5% level?

3. Over the past 20 years, inventory carrying costs for a large tire manufacturing facility have been as shown in the data file (sheet=Timeseries). Data are in thousands of dollars.

   (a) Write down the time series model and plot the data and fit a simple linear regression using time (t) as the independent variable and test for positive autocorrelation at 5% level. (must write hypothesis and p-values)

   (b) If positive autocorrelation is present, use Cochran-Orcutt method and write down the updated estimated model and then predict the carrying cost for the next year.