

Assignment #4 — Due: Tuesday, December 8, 2020, by 10 p.m.

[60 points] Use R to answer the questions. your turned-in solution should include some selected, relevant R code and outputs or graphs but not necessarily all of them.

1. Download the data set, **dataQ1.RData** from the blackboard. Then fit the linear regression model where **x1** is an explanatory variable in **time order** and **Y** is a response variable.
 - (a) Write the fitted regression equation.
 - (b) Find R^2 value.
 - (c) Draw a residual plot. Write a possible problem.
 - (d) Conduct runs test. In detail, write the null and alternative hypotheses first. Then, provide the value of test statistic and the corresponding p-value. Finally, write your conclusion under the 0.01 level of significance.
 - (e) Conduct Durbin-Watson test. Follow the same testing procedure given in (d).

2. Download the data set, **dataQ2.RData** from the blackboard. Then fit the linear regression model where **n** is an explanatory variable and **y** is a response variable.
 - (a) Write the fitted regression equation.
 - (b) Draw a residual plot where x-axis is for the fitted values and y-axis is for the standardized residuals. Write a possible problem.
 - (c) Conduct a square-root transformation on **y** and fit the regression model.
 - (d) From (c), write the fitted regression equation.
 - (e) From (c), calculate the fitted value (in the original scale) when **n** is 40.
 - (f) Add the second order term n^2 in the regression model where **y** is now log transformed.
 - (g) Write the fitted regression equation you fit in (f) in terms of the original scale of **y**.

(5 points for each small question)