

Homework No. 5

1 Instructions

Due Date: Monday April 06th, 11:59 pm on Compass

Homework presentation should be neat. You should submit your homework through Compass. R codes should be submitted jointly with your report. **Please submit your digital files in .pdf or .html format**, so it is easier for the graders to open your files. If you feel it would help, you are encouraged to discuss Homework results with other students, but you have to present assignments individually using your own words. The aim of the homework is to learn the material and practice for the exams. Graduate students should attempt **all** problems unless they are labeled as UG. Undergraduate students can skip problems labeled as GR.

2 Problems

1. **Problem 1:** The *aatemp* data come from the U.S. Historical Climatological Network. They are the annual mean temperatures (in degrees F) in Ann Arbor Michigan, going back about 150 years.
 - (a) Is there a linear trend?
 - (b) Observations in successive years may be correlated. Fit the model that estimates this correlation. Does this change your opinion about the trend?
 - (c) Fit a polynomial model with degree 10 and use backward elimination to reduce the degree of the model. Plot the fitted model on the top of the data. Use this model to predict the temperature in 2020.
 - (d) Make a cubic spline fit with six basis functions evenly spaced on the range. Plot the fit in comparison with the previous fit. Does this model fit better than the selected polynomial model?
2. **Problem 2:** Using the *infmort* data, find a model for the infant mortality in terms of the other variables. Be alert for transformations and unusual points. Interpret your model by explaining what the regression parameter estimates mean.
3. **Problem 3 (UG):** Using the *pulp* data, determine whether there are any differences between the operators. What is the nature of these differences?
4. **Problem 3 (GR):** Determine whether there are differences in the weights of chickens according to their feed in the *chickwts* data. Perform all necessary model diagnostics.

Note: All data sets are from the faraway library in R