Stats 500 Homework 7

Online Submission to Canvas, Due date: 11:59pm, November 7, 2025

1. (Exercise 1 in Chapter 9 of Linear Models with R, 2nd edition) The *aatemp* data come from the U.S. Historical Climatology 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 a 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 your fitted model on top of the data. Use this model to predict the temperature in 2020.
   (d) Suppose someone claims that the temperature was constant until 1930 and then began a linear trend. Fit a model corresponding to this claim. What does the fitted model say about this claim?
   (e) Make a cubic spline fit with six basis functions evenly spaced on the range. Plot the fit in comparison to the previous fits. Does this model fit better than the straight-line model?

2. (Exercise 3 in Chapter 9 of Linear Models with R, 2nd edition) Using the *ozone* data, fit a model with *O3* as the response and *temp, humidity* and *ibh* as predictors. Use the Box–Cox method to determine the best transformation on the response.