

Assignment 7

Q1. The [data](#) for this question come from the US Historical Climatology network. They are the annual mean temperatures (in degrees F) in Ann Arbor going back about 150 years.

- i. Is there a linear trend?
- ii. Observations in successive years may be correlated. Fit a model that estimates this correlation. Does the change your opinion about the trend?
- iii. 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.
- iv. 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?
- v. Make a cubic spline fit with 6 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?

(This is just a single dataset. Obviously it would be foolish to make any conclusions on global warming based on just this data).

Q2. The [data](#) contains Infant Mortality Rates (IMR) and Physical Quality of Life Index (PQLI) scores, which is an indicator of average wealth, for selected Indian States. Using the data set, construct a single model for infant mortality rate, using suitably defined dummy variables for rural-urban and male-female distinctions. You should investigate whether there is a male-female and/or rural-urban difference in mortality rate after adjusting for other covariates.

Q3. [Data](#) on the relationship between corn yield (bushels per acre) and nitrogen (pounds per acre) fertilizer application were studies in Wisconsin in 1994. Use transformations to find a good model for predicting yield from nitrogen. Use a goodness of fit test to check your model.