Exercise 8. Multiple regression

In this exercise we look at the Central England Temperature (CET) dataset in the file `atldjf.txt`. The column 'cet' contains the mean winter central England temperature (°C) from 1866 to 1997. The enxt four columns contain mean sea-level pressure (SLP) measurements (hPa) at four locations. As you work through this exercise you should compile a short report of your analysis, including the regression equation for each model that you fit.

1. Plot CET against year and plot a histogram of the temperatures. What features do you notice in the series? What does the distribution look like?

2. One way to assess evidence for a time trend in CET is to fit a linear regression of temperature on year. Fit this model using `R` and interpret the results. What do you conclude about the changes in CET through time? Examine any diagnostic plots that you consider appropriate and comment on their consequences for your model.

3. Now regress CET on just the Iceland SLP and assess the model fit. What does the estimate of the slope parameter say about the relationship between CET and Iceland SLP? Can you explain this result scientifically?

4. The plot of residuals against observation order indicates a slight, increasing time trend. Fit the multiple regression of CET on Iceland SLP and year. Examine the significance of the two explanatory variables and assess the model fit. What conclusions do you draw now about any time trend in CET?

5. If you have time, experiment by including and excluding different SLP series from the regression and compare the fitted models. Also try adding a polynomial time trend by storing squared year in a new column.