Sec 8.4 – Checking Assumptions in 1-way ANOVA

The usual 1-way ANOVA assumes
- Normal populations
- Independent residuals
- Equal variances.

To check if all groups in an ANOVA situations are normally distributed with equal variances,
- If we have enough values in each group
  - we can draw normal plots for all groups on the same graph and check that the normal plots are
    - straight (normal)
    - parallel (equal variances).
- For experiments with multiple factors and not many values in each treatment group,
  - we can’t judge normality with many normal plots of few points

Other options
- Side by side box plots
- Normal plot of residuals
- Plot residuals verses predicted values

These plots will often pick up situations where the variances are changing with the means
- e.g. groups with larger values have larger variances.
- See for example Figure 8.6 (8.5 6th edition).

In the end all of the residuals should be normally distributed with mean zero and the same variance.
- Check a normal plot of all residuals after all other diagnostics are ok
- A normal plot of all residuals, such as Figure 8.7 (8.6 in 6th), should look straight indicating normality.
- This residual plot is only useful after the other diagnostic plots have been checked and corrective measures, such as transformations discussed in section 8.5, have been performed.

Independence
- The remaining assumption is independent residuals.
- This is determined by knowing how the experiment was performed.
- We cannot analyze the experiment appropriately unless we know how the experiment was performed.
- If measurements are taken in time order
  - We can check for correlations between residuals taken at similar times.
  - Test such as Durbin-Watson test