0. Problem 5 in Homework 1
1. KNNL Problem 2.18
2. KNNL Problem 2.19

The next 5 problems continue the analysis of the plastic hardness data begun in the first homework.

3. Plot the data using proc gplot. Include a smoothed function on the plot by using the i = smnn option on the symbol1 statement, where nn is a number between 1 and 99. Is the relationship approximately linear?

4. Plot the 95% bounds (confidence band) for the mean (use i=r1clm on the symbol1 statement).

5. Plot the 95% bounds for individual observations (using i=r1cli).

6. Give an estimate of the mean hardness that you would expect after 36 and 43 hours; and a 95% confidence interval for each estimate. Which confidence interval is wider and why is it wider?

7. Give a prediction for the hardness that you would expect for an individual piece of plastic after 43 hours; give a 95% prediction interval for this quantity.

8. Calculate power for the slope using the results of text Problem 1.22 as follows. Assume $n = 16$, $\sigma^2 = MSE$, and $SS_X = 1280$. (Note: this last value could be obtained with SAS using

   
   proc univariate data = (dataset name);
   var time;
   
   and looking at the output titled “Corrected SS” in the Moments section.)

   (a) Find the power for rejecting the null hypothesis that the regression slope is zero using an $\alpha = 0.05$ significance test when the alternative is $\beta_1 = 0.5$.

   (b) Plot the power as a function of $\beta_1$ for values of $\beta_1$ between -2.5 and +2.5 in increments of 0.25.

9. Given that $R^2 = SSM/SST$, it can be shown that $R^2/(1 - R^2) = SSM/SSE$. If you have $n = 28$ cases and $R^2 = 0.3$, what is the $F$-statistic for the test that the slope is equal to zero?