**Analysis of the calories and the fat: Cereal Dataset**

Information on the distribution of various groups of nutrients among seventy-seven commonly available breakfast cereals was obtained from the *statistical graphics exposition* in 1993. Is there a relationship between the calories and the fat (in grams)? If so, is the relationship proportional?

A plot of the relationship between calories and the fat (Figure 1) showed a linear relationship. The estimated relationship (R-Square= 0.2084; p < .0001) is

Calories = 95.13 (SE 3.14) + 9.81 (SE 2.21)\*Fat

Therefore, the calories will increase 104.94 as the fat increase in 1 gram. The standard error of slope is 2.21, so p-value < 0.0001(p-value<0.05). So we can conclude that there is a positive relationship between the calories and fat. The 95% confidence interval for the slope is from 5.41 to 14.20. It means the calories will increase 5.41 at minimum and 14.20 at minimum when the fat increase by 1 gram. The huge difference may due to other nutrients’ affect and it can be explained by the low R-Square in this model. So we cannot get an certain number of the proportion with high confidence level. An estimate of the calories per serving for a cereal with 4 grams of fat is 134.37. And for the two measures of uncertainty, we are 95% confident to say that the calories is between 116.77 and 151.91 when the cereal is 4 grams. The two measures of uncertainty was bounded by the blue area in Figure 1.

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| Scatterplot of calories by fat overlaid with the fit line, a 95% confidence band and lower and upper 95% prediction limits. |  |
| Figure 1. Relationship between calories and fat(g) | Figure 2. QQ plot of the residual not show any large scale outliers from normality of the residuals. |