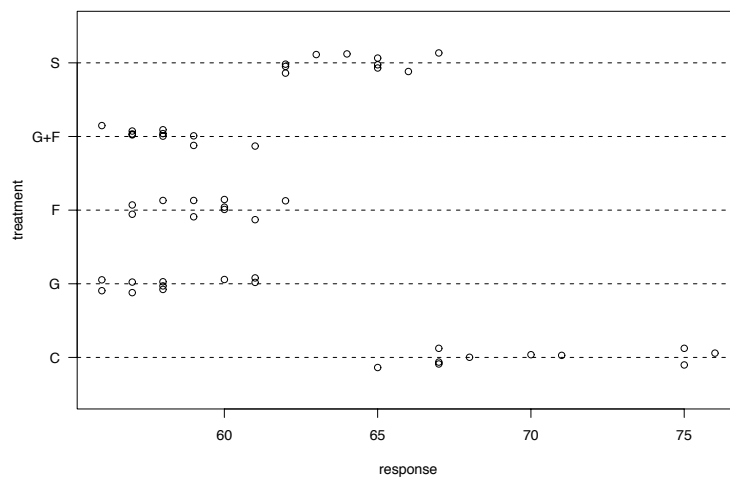


**Homework Assignment #5**  
**(Due Wednesday, November 16, 2005)**

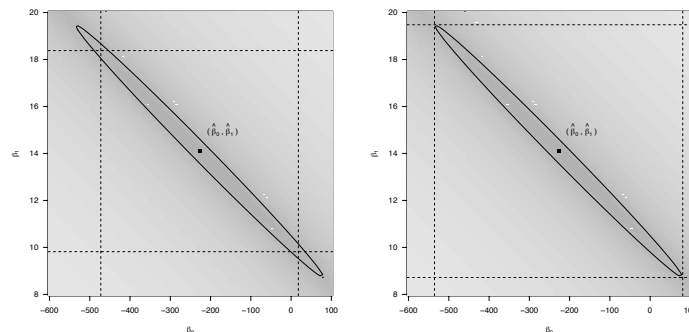
Please hand in a hard copy of your R code, and send an electronic version of it to Kenny (kshum@jhsph.edu).

1. Get <http://www.biostat.jhsph.edu/~iruczins/teaching/140.752/data/hw5.1> which contains measurements of the lengths of pea sections grown in some tissue cultures. The purpose of the experiment was to investigate the effects of various sugars on growth. Four different treatments were used, plus one control (no sugar): No sugar (C), glucose (G), fructose (F), glucose + fructose (G+F), and sucrose (S).

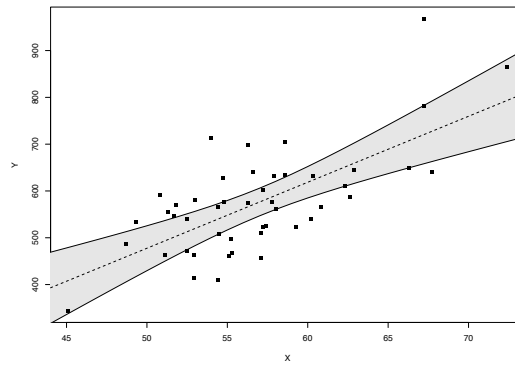


Using R, generate a table with 95% unadjusted, Bonferroni, maximum modulus, and Scheffe confidence intervals for the group means. Assume equal variance within each group.

2. Get <http://www.biostat.jhsph.edu/~iruczins/teaching/140.752/data/hw5.2> which contains some values for a predictor  $X$  and the response  $Y$ .
  - (a) Use your function `mylrm()` from Homework assignment #2 to fit the linear model  $E[Y] = \beta_0 + \beta_1 X$ , and plot a joint confidence region for the two parameters. Highlight the unadjusted confidence intervals for the two parameters, and the Scheffe simultaneous confidence intervals.



(b) Generate a 95% confidence band for  $E[Y|X]$ .



3. Verify the table on page 44 in the class notes by simulation. I obtained the results in the table below using  $n_2 \equiv 20, \sigma_2^2 \equiv 1$ , and 10,000 repetitions for each cell.

$n_1/n_2$	$\sigma_1^2/\sigma_2^2$						
	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8
$\frac{1}{2}$	0.01	0.02	0.03	0.05	0.08	0.11	0.14
1	0.05	0.05	0.05	0.05	0.05	0.05	0.05
2	0.14	0.11	0.08	0.05	0.03	0.02	0.01
4	0.24	0.18	0.11	0.05	0.03	0.01	0.00
8	0.34	0.23	0.13	0.05	0.01	0.00	0.00