

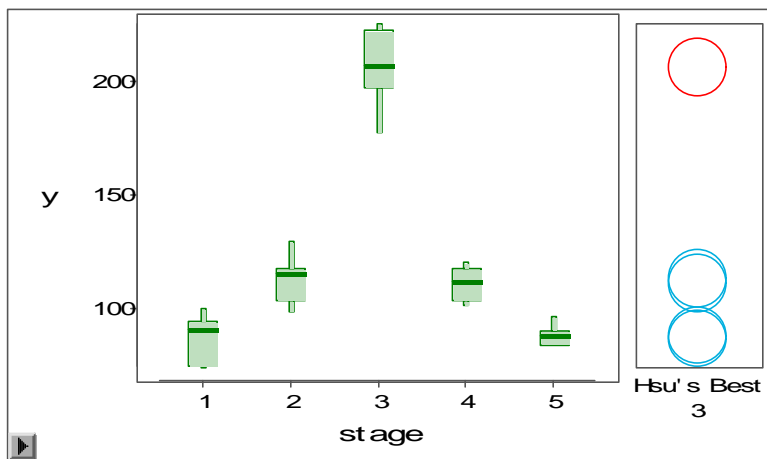
1. Consider the data in Chapter 2 Problem 3. Add code to the SAS program *molt.sas* to answer the following questions.

a) Does the mean serum T3 concentration appear to vary across the five stages considered in this experiment? Provide a test statistic, its degrees of freedom, a *p*-value, and a conclusion.

b) Conduct all pairwise comparisons among the five stage means. State which pairs of stages have differing mean serum T3 concentrations using a method that makes one or more type I errors no more than 5% of the time.

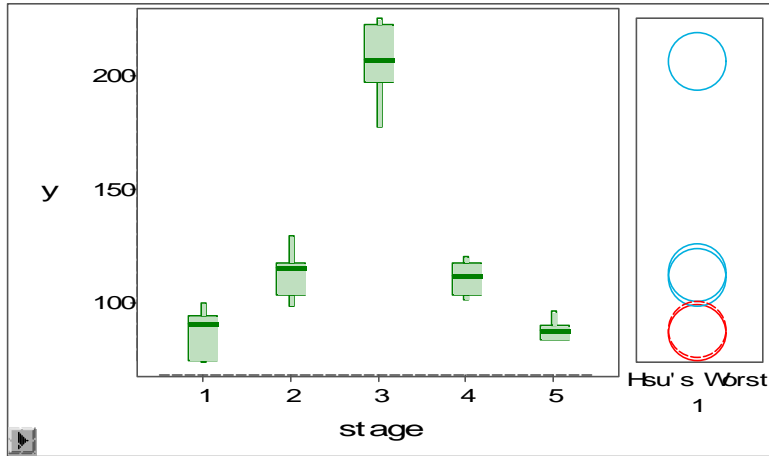
c) Suppose the researchers are interested in testing for a difference between the control stage ("pre-molt" in the text and stage 1 in the SAS code) and each of the other four stages. They wish to conduct these four tests as one-sided tests where the null hypothesis says that there is no difference between the mean serum T3 concentration for the control stage and the mean serum T3 concentration for the stage being tested, and the alternative says that the mean serum T3 concentration for the stage being tested is greater than the mean serum T3 concentration for the control stage. State which (if any) of the four other stages have significantly greater mean serum T3 concentration than the control. Use a method that makes one or more type I errors no more than 5% of the time.

d) Use the output provided below from Hsu's method for all possible comparisons with the largest observed mean to list a set of stages which includes the stage with the highest mean serum T3 concentration with 95% confidence.



Hsu's Comparison with Best						
Alpha = 5%		DF = 20	Root MSE = 12.47		d = 2.3044	
Level	Best	Mean Diff	Lower Limit	Upper Limit	p Value	
1	3	-119.782	-137.957	0	<.0001	
2	3	-93.3040	-111.479	0	<.0001	
4	3	-95.4620	-113.637	0	<.0001	
5	3	-118.184	-136.359	0	<.0001	

e) Use the output provided below from Hsu's method for all possible comparisons with the smallest observed mean to list a set of stages which includes the stage with the smallest mean serum T3 concentration with 95% confidence.



Hsu's Comparison with Worst					
Alpha = 5%		DF = 20	Root MSE = 12.47		d = 2.3044
Level	Worst	Mean Diff	Lower Limit	Upper Limit	p Value
2	1	26.4780	0	44.6530	0.0054
3	1	119.7820	0	137.9570	<.0001
4	1	24.3200	0	42.4950	0.0100
5	1	1.5980	-16.5770	19.7730	0.7279

f) Based on the output above, provide a p -value that can be used to answer the question, "Is there a significant difference between the mean serum T3 concentrations corresponding to the stages with the two smallest observed means?". Provide an answer to this question based on the p -value.

2. Answer parts (a) through (c) of Chapter 3 Problem 8. You may assume that the experiment in question is balanced (i.e., the number of replications is the same for all treatments).