

STT 667 Project, Winter 2009

Due Tuesday, March 17th, 5:45 PM

The following experiment is reported in *Design and Analysis of Experiments*, by Dean and Voss, 1999

Water boiling experiment (Kate Ellis, 1986)

The experiment was run in order to examine the amount of time taken to boil a given amount of water on the four different burners of her stove, and with 0, 2, 4, or 6 teaspoons of salt added to the water. Thus the experiment had two treatment factors with four levels each. The experimenter ran the experiment as a completely randomized design by taking $r = 3$ observations on each of the 16 treatment combinations in a random order. The data are shown in the table below. The experimenter believed that there would be no interaction between the two factors, and she was primarily interested in pairwise comparisons of main effects. Informally, she was also interested in examining whether there is a linear effect of salt. In addition, she thought observation number 13 was an outlier, in view of its residual, since it was an observation taken late on a Friday evening.

**Data for the water boiling experiment, in minutes.
(Order of observation is in parentheses.)**

Burner	Salt (teaspoons)			
	0	2	4	6
Right back	7(7)	4(13)	7(24)	5(15)
	8(21)	7(25)	7(34)	7(33)
	7(30)	7(26)	7(41)	7(37)
Right front	4(6)	4(36)	4(1)	4(28)
	4(20)	5(44)	4(14)	4(31)
	4(27)	4(45)	5(18)	4(38)
Left back	6(9)	6(46)	7(8)	5(35)
	7(16)	6(47)	6(12)	6(39)
	6(22)	5(48)	7(43)	6(40)
Left front	9(29)	8(5)	8(3)	8(2)
	9(32)	8(10)	9(19)	8(4)
	9(42)	8(11)	10(23)	7(17)

Plan and conduct the data analysis as appropriate, with and without the suspected outlier. Provide a report on the experiment and analysis. Your report should be well written and well organized. Begin the report with a synopsis, providing a brief sketch of the experiment, analysis and results, followed by a table of contents for the rest of the report. As for the nitty gritty details, they can be relegated to the rest of the report, which may include multiple sections and perhaps appendices. The report should be well written. Brevity, clarity, organization and completeness are all desirable attributes in a report, as is legibility!

The data for the experiment are provided on the course homepage.