Statistics 506
Test 2

1. Sentence length (in months) was studied as a function of factors A (County), B (Crime), and C (Ethnicity). Four inmates' records for each cross-classification of these factors were randomly selected for the study. Results appear in the table below.

A	B	C	Sentences	Average Sentence
-1	-1	-1	20,23,24,20	21.75
1	-1	-1	28,28,23,30	27.25
-1	1	-1	34,33,29,34	32.50
1	1	-1	30,33,25,35	30.75
-1	-1	1	20,24,20,15	19.75
1	-1	1	30,33,26,25	28.50
-1	1	1	30,34,32,33	32.25
1	1	1	33,34,32,30	32.25

(a) Use Minitab to analyze the replicated design and compute T statistics. What is the T critical value for a .05 test? Which effects are significant at the .05 level? Using the significant effects, what would be the EMR if we wanted to maximize the response?

(b) Now analyze the experiment using the column of averages. Based on the effects plot, which effects are significant (be sure to rely on your judgment as much as Minitab's ad hoc test)? Are your results consistent with the results for the replicated analysis? What is your estimate of experimental error from the analysis of the averages?

(c) Using MSPE as your estimate of error, how many replications would you need to detect effects of size 1.0? 2.0? 3.0?

2. A researcher studying 6 factors in 16 runs assigned E=ABCD and F=AC. What three effects are aliased with I? What is the resolution of this design? Why? The data for this experiment appear in the table below. Analyze the data using an effects plot and report your conclusions. Which effects seem to be active (make any qualifications necessary)? How would you have chosen to study 6 factors in 16 runs?

A	B	C	D	E	F	Response
-1	-1	-1	-1	1	1	53.4
1	-1	-1	-1	-1	-1	44.4
-1	1	-1	-1	-1	1	52.1
1	1	-1	-1	1	-1	52.5
-1	-1	1	-1	-1	-1	43.5
1	-1	1	-1	1	1	62.6
-1	1	1	-1	1	-1	53.8
1	1	1	-1	-1	1	59.2
-1	-1	-1	1	-1	1	51.9
1	-1	-1	1	1	-1	55.0
-1	1	-1	1	1	1	62.0
1	1	-1	1	-1	-1	53.1
-1	-1	1	1	1	-1	53.7
1	-1	1	1	-1	1	61.8
-1	1	1	1	-1	-1	51.7
1	1	1	1	1	1	70.3