Midterm

1. In each of three randomly selected states, four counties are randomly chosen. In each county, three farms are randomly selected and the yield per acre (in bushels of corn) from each of two randomly chosen fields is recorded.

   (a) Write a complete model for the experiment.

   (b) What are the EMS for all model terms?

   (c) How would you test whether variation among states is zero?

2. Consider a cross-over design conducted over two separate days with the following layout:

	Day 1			Day 2		
	Subject					
Period	1	2	3	4	5	6
1	A=20	B=14	C=25	A=22	B=17	C=20
2	B=18	C=28	A=15	C=24	A=27	B=12
3	C=29	A=17	B=19	B=13	C=22	A=25

   (a) Using SAS or Minitab, test for treatment effect, period effect, day effect, subject effect and residual effect. Is a test on a *day by treatment* interaction reasonable? How about a test on *day by subject*?

3. A fiber optic cable company is studying a new fiber ribbon production line. Assume the response is average meters of ribbon before a defect is observed and the variance of the response is $\sim 10^6 m^2$. Produce a power curve under the assumption that engineers wish to detect a difference in average defect rate between the new line and the three existing lines of .5 km. How many samples should be produced by each line in order to detect the average difference of .5 km with 90% probability?