

STAT 495, Fall 2008

Homework Assignment #6

1. In the manufacture of computer components wafers containing 50 chips are made. The location of chips on a wafer is measured for 30 wafers. A defective chip is defined whenever a miss-registration, in terms of vertical and/or horizontal distance from the center, is recorded. The data appear below. The data can also be obtained from the course web page.

Wafer Number	Number Defective	Wafer Number	Number Defective	Wafer Number	Number Defective
1	12	11	5	21	20
2	15	12	6	22	18
3	8	13	17	23	24
4	10	14	12	24	15
5	4	15	22	25	9
6	7	16	8	26	12
7	16	17	10	27	7
8	9	18	5	28	13
9	14	19	13	29	9
10	10	20	11	30	6

- a) Calculate the average number defective for the 30 wafers and use this to compute the limits for an np control chart. Do these calculations by hand.
 - b) Use JMP or Minitab to actually construct the np chart.
 - c) Are there any wafers that plot outside control limits? If so, which wafers are they and what are the associated numbers of defective chips?
 - d) If special causes are found for the wafers identified in c) and those special causes removed, how will the centerline and control limits change on the np chart?
2. At an automobile assembly plant, body sides are attached to the underbody at a particular assembly station. A fault (defective car) occurs whenever both body sides are unable to be placed on the car properly. On the next page are the number of cars built and the number of faults for each of 50 day's production. Of the 24,317 cars built there are 1,652 faults (defective cars). The data is also available on WebCT and the course web page.
- a) What are the center line and control limits for the p control chart for Day 1?
 - b) Use JMP or Minitab to construct the p control chart.
 - c) Are there any days that plot outside the control limits? If so, what days are they and what are the associated fractions defective?
 - d) If special causes are found for the days that plot outside the control limits would you want to eliminate those special causes? Explain briefly.

Data on Cars produced and Faults (Defective Cars)

Day	Cars	Faults	Day	Cars	Faults	Day	Cars	Faults	Day	Cars	Faults
1	484	43	16	512	28	31	518	36	46	496	28
2	445	44	17	422	21	32	500	30	47	501	13
3	482	33	18	406	30	33	469	52	48	474	59
4	476	42	19	477	25	34	507	33	49	497	43
5	511	43	20	497	45	35	530	26	50	487	31
6	504	47	21	522	13	36	517	26			
7	535	33	22	516	21	37	497	25			
8	517	51	23	470	34	38	478	34			
9	453	18	24	441	21	39	426	34			
10	479	38	25	504	32	40	453	28			
11	514	28	26	506	31	41	495	30			
12	509	17	27	477	31	42	474	45			
13	443	24	28	468	49	43	530	42			
14	453	29	29	470	36	44	506	35			
15	494	38	30	486	26	45	489	31			

3. For the data in problem 2, the plant manager is interested in whether the number of good cars (Cars – Faults) is in a state of statistical control.
 - a) What is the average number of good cars built per day?
 - b) Use your answer in a) to calculate c control chart limits for the number of good cars built per day. Do this calculation by hand.
 - c) Use JMP or Minitab to construct the c control chart for the number of good cars built.
 - d) Are there any days that plot outside control limits? If so, what days are they and how many good cars were built on those days?