

X-Bar and R Chart Lab

Part 1

For this part of the lab, use the data on the "Running Tests" tab of the spreadsheet

An XP team has gathered data about the change in the number of running tests each day for a year and stored it in the associated spreadsheet. This team works in two week iterations producing customer-visible functionality each iteration. However, they also package a release every four iterations (every eight weeks). You are going to analyze this data to see if their process is in control. I do not need you to turn in the complete spreadsheet; instead, turn in a Word document that includes the charts resulting from your analysis. Remember these things:

- I want the warning and action lines to show up on the chart. The easiest way to do that is to play with the scale of the y-axis.
- We always do range analysis first.
- Even if the range analysis makes things look out of control, I want to see the X-bar chart, too.
- Answer all of my questions carefully. Sometimes I ask for an explanation of something and sometimes I ask a specific question. I want answers to both! Each answer should be presented as if it were a report to management (appropriate charts and well-formed paragraphs).

Step 1

Since they work in two week iterations, it seems rational to group the data by iteration (which is the way they've set up the spreadsheet).

1. Since $n > 12$, complete the appropriate analysis using X-bar and S Charts (see section 7.5 for the calculations)
2. Explain whether or not their process seems to be in control.

Step 2

We always need to be concerned about the homogeneity of the data we are grouping.

1. Without looking at the data, do you think it is likely that the team produces the same number of working tests each day of an iteration? Remember, iterations cover two weeks, so we have weekends involved, too.
2. Once you've thought about it, look at the data. Do the values for each day seem to be homogeneous? If not, what days seem different.
3. In either case, perform some statistical analysis to justify your position. (Remember back to your statistics class to find a good test for this analysis)

Step 3

Let's assume for the moment that, in step 3, you decided the data was not homogeneous. That generally means that we need to group at a higher level. Re-read the description of the time to find another rational grouping and perform the appropriate analysis to see if their process is in control. Explain your grouping and justify your conclusions.

Part 2

For this part of the lab, use the data on the "Resistors" tab of the spreadsheet.

This data represents data gathered from the manufacturing of 50 Ohm resistors. Each shift has one tester and he cycles between many manufacturing lines. The data is the resistance of the resistors he tests. His schedule brings him to this line once an hour and he tests 5 resistors each time he comes by.

Step 1

Compute X-Bar and R charts for this data. Does everything look in control?

Step 2

There is some risk that we are gathering the data too closely together.

1. Calculate the standard error using the means instead of the ranges.
2. Does that make a significant difference?
3. What conclusion do you draw about in sample vs. between sample variance?
4. Is the analysis you did in Step 1 the correct analysis for this situation?