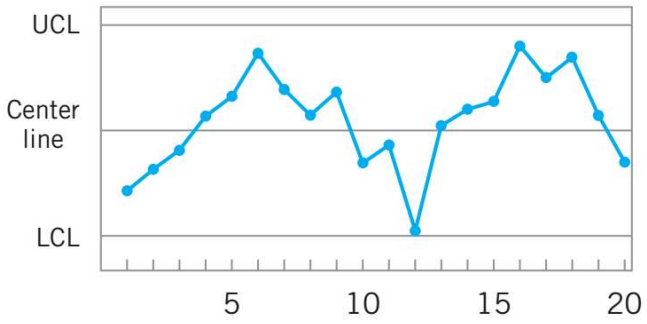
Homework 8

Due 4/3/25 by end of day

Directions: Reading the chapter 5 and 6 will help solve these problems along with content seen in class.

1) Most control charts choose 3 sigma levels for their control limits because it seems to be a good balance between type II and type II errors. Discuss the following:
    a. If narrower limits are chosen, what happens to the magnitude of type I and II error?
    b. What effect does the sigma level (high or low) have on alpha?
2) Laboratory glassware shipped from the manufacturer to Dr. Renner's Lab via an overnight package service has arrived damaged. Develop a cause-and-effect diagram that identifies and outlines the possible causes of this event. You won't necessarily be graded on the details, but include the major components of the "fishbone" diagram.
3) Sketch out diagrams and explain why it is important to control both process mean and variability (see Figure 6.1 in the book)
4) Problem 5.16, 5.17, 5.18 (5.19, 5.22, and 5.23in the 7th edition) – use the below control chart (you can cut and paste into as separate file and print it off as part of your answer). For 5.17 use Sensitizing Rules 5-10, and for 5.18 use the Western Electric Rules (1-4).



5) Problem 6.1
6) A hospital emergency department is monitoring the time require to admit a patient using $\bar{x}$ and R charts. The table below presents summary data for 20 subgroups of two patients each (time is in minutes)

Subgroup	Xbar	R
1	8.3	2
2	8.1	3
3	7.9	1
4	6.3	5
5	8.5	3
6	7.5	4
7	8	3
8	7.4	2
9	6.4	2
10	7.5	4
11	8.8	3
12	9.1	5
13	5.9	3
14	9	6
15	6.4	3
16	7.3	3
17	5.3	2
18	7.6	4
19	8.1	3
20	8	2

a) Use these data to determine the control limits for the $\bar{x}$ and R control charts for this patient admitting process.
b) Plot the preliminary data form the first 20 samples on the control charts that you set up in part (a). Is the process in statistical control?

7) A high-voltage power supply should have a nominal output voltage of 350V. A sample of four units is selected each day and tested for process-control purposes. The data shown in the table below give the difference between the observed reading on each unit and the nominal voltage times 10; that is xi = (observed voltage unit on i – 350)*10. Use Minitab to set up the $\bar{x}$ and R charts on this process. Is the process in statistical control?

Sample #	X1	X2	X3	X4
1	6	9	10	15
2	10	4	6	11
3	7	8	10	5
4	8	9	6	13
5	9	10	7	13
6	12	11	10	10

7	16	10	8	9
8	7	5	10	4
9	9	7	8	12
10	15	16	10	13
11	8	12	14	16
12	6	13	9	11
13	16	9	13	15
14	7	13	10	12
15	11	7	10	16
16	15	10	11	14
17	9	8	12	10
18	15	7	10	11
19	8	6	9	12
20	13	14	11	15