ISYE 430/530 Homework #6

7.3. Table 7E.1 Contains data on examination of medical insurance claims. Every day 50 claims were examined.

(a) Set up the fraction nonconforming control chart for this process. Plot the preliminary data in Table 7E.1 on the chart. Is the process in statistical control?

(b) Assume that assignable causes can be found for any out-of-control points on this chart. What center line and control limits should be used for process monitoring in the next period?

TABLE 7E.1

Medical Insurance Claim Data for Exercise 7.3

Day	Number Nonconforming	Day	Number Nonconforming
1	0	11	6
2	3	12	4
3	4	13	8
4	6	14	0
5	5	15	7
6	2	16	20
7	8	17	6
8	9	18	1
9	4	19	5
10	2	20	7

7.14. A process is controlled with a fraction nonconforming control chart with three-sigma limits, $n = 100$, UCL $= 0.161$, center line $= 0.080$, and LCL $= 0$.

a. Find the equivalent control chart for the number nonconforming.

b. Use the Poisson approximation to the binomial to find the probability of a type I error.

c. Use the correct approximation to find the probability of a type II error if the process fraction nonconforming shifts to 0.2.

d. What is the probability of detecting the shift in part (c) by at most the fourth sample after the shift?

7.34. A paper mill uses a control chart to monitor the imperfection in finished rolls of paper. Production output is inspected for 20 days, and the resulting data are shown in Table 7E.9. Use these data to set up a control chart for nonconformities per roll of paper. Does the process appear to be in statistical control? What center line and control limits would you recommend for controlling current production?

Table 7E.9 Data on Imperfections in Rolls of Paper

Day	Number of Rolls Produced	Total Number of Imper-fections	Day	Number of Rolls Produced	Total Number of Imper-fections
1	18	12	11	18	18
2	18	14	12	18	14
3	24	20	13	18	9
4	22	18	14	20	10
5	22	15	15	20	14
6	22	12	16	20	13
7	20	11	17	24	16
8	20	15	18	24	18
9	20	12	19	22	20
10	20	10	20	21	17

Extra Questions for Graduate and Honor Students:

7.26. A fraction nonconforming control cart has center line 0.01, UCL = 0.0399, LCL = 0, and $n = 100$. If three-sigma limits are used, find the smallest sample size that would yield a positive lower control limit.