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Applied Stochastic Models (SS 09)

Problem Set 13

Problem 1

Control charts for $\overline{X}$ and R are to be set up for an important quality characteristic. The sample size is $n = 5$, and

$$\sum_{i=1}^{35} \overline{x_i} = 7805, \quad \sum_{i=1}^{35} R_i = 1200.$$

(a) Find trial control limits for $\overline{X}$ and R charts.

(b) Assuming that the process is in control, estimate the process mean and standard deviation. $(A_2 = 0.577)$

Problem 2

A sampling plan, calling for a sample of size $n = 50$, has the acceptance number $c = 3$. Assuming that the lot size is very large, calculate the probability of accepting a lot of incoming quality 15% defective and rejecting a lot of incoming quality 4% defective

(a) by using the binomial probabilities and

(b) by using the Poisson approximation of the binomial distribution.

(c) In the above problem, use the Poisson approximation to calculate $L(p)$ for $p = 0.01, 0.02, ..., 0.20$. Sketch the OC curve for this sampling plan and read off the consumers and producers risk corresponding to an AQL of 4% and an LTPD of 14%.

Problem 3

25 successive samples of 200 switches , each taken from a production line, contained, respectively,

$$6, 7, 13, 7, 0, 9, 4, 6, 0, 4, 5, 11, 6, 18, 4, 1, 9, 8, 2, 17, 9, 12, 10, 5, \text{ and } 4 \text{ defectives.}$$

If the fraction defective is to be maintained at 0.02, construct a p chart for these data and state whether or not this standard is being met.

Problem 4

Consider the following double sampling plan. The first sample has size 15 and the acceptance number is 1, the rejection number is 5 and the second sample has size 30, the acceptance number is 5 and the rejection number is 6. If the incoming quality is $p = 0.05$, determine the average sample number.