MA30118 - Question Sheet Four

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Attempt all questions. Hand in by 17:00 Tuesday 25th April either to me in lectures, or the envelope on my door, 1W4.8.

1. A double sampling scheme has $n_1 = 50$, $n_2 = 70$, $c_1 = 0$ and $c_2 = c_3 = 2$.

   (a) If the $AQL = 0.01$ and $LTPD = 5$, calculate (to 1 decimal place) the producer's risk and the consumer's risk.

   (b) If a rectification scheme is applied, plot the AOQ $(= pOC(p))$ for the scheme and estimate the AOQL. [Either by using your favourite graphics package or by evaluating AOQ(p) at a number of values of p, say 0, 0.01, 0.02, 0.04, 0.06, 0.08, 0.10, 0.12, 0.14, 0.16. Restricting p to between 0 and 0.16 should give a nice plot.]

   (c) Plot the ASN for the scheme and estimate the maximum value of the ASN. [Again either by hand or by your favourite graphics package; restricting p to between 0 and 0.2 should give a nice plot.]

   (d) Compare your ASN with the sample size required for the corresponding single sampling scheme having the same AQL, LTPD, producer's risk and consumer's risk. Comment on your results.

2. A certain protective material is satisfactory if it is perforated by not more than 15% of pellets fired under standard conditions. It is not acceptable if the percentage is more than 30. The consumer's risk is 0.02 and the producer's risk is 0.01.

   (a) Construct a sequential probability ratio test to determine whether the material should be accepted.

   (b) What is the smallest number of observations at which the rejection of the batch can occur?

   (c) What is the smallest number of observations at which the acceptance of the batch can occur?

   (d) Carry out the test on the following data: perforations occurred at (and only at) shots numbered 8, 15, 20, 32, 37, 40, 46, 54, 61, 67, 77. [Of course, in reality, no shots are fired once a decision has been made.]