

QUALITY CONTROL

Exam

Duration: 02 hours. Type: “open book” exam.

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1. Who was the inventor of the control chart? **2.** And in what country did this happen? **3.** Who invented the Monte Carlo method? **4.** What American first made Quality very important in Japan?

Some packages of a manufactured product are weighed on a balance. The weight of a package, considered Gaussian, should be between 995 and 1008 g.

a) A Gaussian variable is “almost always” at a distance less than 3 times its standard deviation (s) from its mean (m). Calculate the probability of this event.

b) Suppose that the package of the problem has $m=999.0$ g and $s=2.2$ g. Simulate a sample of size $n=20$ weights from (pseudo-) random numbers obtained by the randu method (on the course website) with the seed YYYYMMDD, your birthday (such as 19821104). (As this gives numbers in the range $2^{31}-1$, they must be brought to the range 0–1.) Use the seed itself to produce the first random number.

c) With the simulated sample (are the data enough?), in subgroups of size 2, calculate and roughly draw an \bar{X} , R control chart.

d) Consider as defective (nonconforming) a package with its weight out of the limits mentioned. According to the convenient usual standard: choose a lot size, N , compatible with n ; and determine the acceptability of the lot for an AQL = 1 %.

e) Determine, from the generated sample, the acceptability of the lot, if it is AQL = 1 % for the lower specification limit and AQL = 1.5 % for the upper specification limit.

f) Confirm, as best as possible, the smaller M of the previous question.

Classification: 1., 2., 3., 4.:	3 (for the whole set)
<i>a)</i>	1
<i>b)</i>	2
<i>c)</i>	4
<i>d)</i>	2
<i>e)</i>	3
<i>f)</i>	4
<i>supplement</i>	1 (Total: 20)

The classifications will be shown in the Internet no later than Tuesday, the 22.nd of this month.

