Re: quality control

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- *Date*: Mon, 13 Nov 2006 10:04:03 −0600

Richard Ulrich <Rich.Ulrich@xxxxxxxxxxx> wrote in
news:vnsfl2d685snrulj63m9iel784mhgnjop8@xxxxxxx:

> On 12 Nov 2006 17:00:04 −0800, "Frank" <deps_bear@xxxxxxxxx> wrote:
>
>> If I know a product fails .01% of the time and I have 1500 items I'm running through a process. How many items do I need to check with, say, 99% confidence that all the items are built correctly.
>
> How many failures do you expect? Almost always, zero. This is dealing with exact probabilities. For a higher failure rate, you might want to look at the p of success, and raise to a power, e.g., (.9999)^n . For the tiny p of 0.01%, the figuring can be pretty much additive
>
> You want to have only so many items *unchecked* that there will be, on the average, only 1 bad item in 100 samplings −− so that 99 times out 100, there will be none.
>
> You expect 1 failure in 10,000. One hundred samplings that each fail to test 100 items will meet that condition. So you need to check 1400 of each 1500.

How did you go from 100 samplings of size 100 to the number 1400?

However you did it, you are then claiming that after examining 1400 items that you are 99% confident that there are no defective items in the remaining 100 items, when the past experience indicated that the failure rate was 0.0001 (so it was quite unlikely that you would have observed _any_ even if all 1500 were examined? Why not stop at 1300? Seems to me that you might have incorrectly inverted the problem to one of reducing the size of the population at risk.

The best answer to a binomial acceptance sampling problem in a finite population that I have seen recently was given by Ted Harding in

Medstats:
<http://groups.google.com/group/MedStats/msg/65e62e78dfe9b3f0?dmode=source&hl=en>

When I apply his method I get a confidence level of .9333 for an expected rate of 1/1500 and an observed of zero after 1400 were sampled and that is a much higher predicted rate (at least on a ratio scale) than the OP specified. (code in the R system.)

```
N<−1500; M<−1; x<−0;
k<−1400; 1−phyper(x,M,N−M,k)
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[1] 0.9333333

So even with a higher prior than specified, you cannot get close to 99%. If you assume a prior of 2/1500, you can get to 0.9956 after sampling 1400. (Even after 1350, you can get to 0.99006 with the rate of 0.000667.) I see no way that with an expected as low as 0.0001 and sample size of 1500 that you can anywhere near the confidence level specified.

−−
David Winsemius

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