Answer on Question #86017 – Math – Statistics and Probability
Question

Components are placed into bins containing 100. After inspection of a large number of bins the average number of defective parts was found to be 10 with a standard deviation of 3.

Assuming that the same production conditions continue, except that bins containing 300 were used:

1.2.1 what would be the average number of defective components per larger bin?

Solution

Proportion defective is $p = 0.1$ (from the inspection phase). So, proportion good is $q = 1 - p = 0.9$. We are given what the Mean and S.D. are for inspection phase, but as a check on what we have learned about distributions, these clearly come from:

$Mean = E(X) = np = 100 \cdot 0.1 = 10,10$ components are defective on average

$\text{S. D.}(X) = \sqrt{npq} = \sqrt{100(0.1)(0.9)} = 3$

Now we have the sample size $N = 300$.

Production is assumed to be continuing as before, so proportion defective is $p = 0.1$. Hence $E(X)$ for larger bin size

$E(X) = Np = 300 \cdot 0.1 = 30$