Answer on Question # 41938, Math, Statistics and Probability

How large a sample is needed if we wish to be 95% confident that the sample mean will be within 0.0005 inch of the true mean? Assuming the population standard deviation is 0.0015 and the population is normal.

Solution

If is used as an estimate of μ, we can be $(1 - \alpha)100\%$ confident that the error will not exceed a specified amount e when the sample size is

$$n = \left(\frac{Z_{\frac{\alpha}{2}} \cdot \sigma}{e}\right)^2.$$

In our case:

$$n = \left(\frac{Z_{0.025} \cdot 0.0015}{0.0005}\right)^2 = 34.5744.$$

That is, a sample with size 35 needed if we wish to be 95% confident that our sample mean will be within 0.0005 inch of true mean.

Answer: 35.