Answer on Question #46542 – Math – Statistics and Probability

A market research study is to be conducted among users of a particular type of computer system. How many users should be sampled to estimate the percentage of users who plan to add terminals to within 5 percentage points with 97% confidence?

Solution

The sample size needed to estimate the percentage of the population is

$$n = \left(\frac{z\frac{\alpha}{2}}{E}\right)^2 \bar{p}(1-\bar{p}),$$

where $\bar{p}$ is the sample proportion of the people that writes with the left hand, $\alpha = 1 - 0.97 = 0.03$ is the level of confidence, $z_{\frac{\alpha}{2}} = z_{0.015} = 2.17$ is z-score, $E = 0.05$.

We don't have any credible estimate for the percentage of users who plan to add terminals, so we must use $\bar{p} = (1-\bar{p}) = 0.5$. This is the conservative procedure because the product $\bar{p}(1-\bar{p})$ takes its highest value when $\bar{p} = 0.5$. The conservative procedure may give us a sample size larger than necessary, but we can be sure our sample won't be too small.

So,

$$n = \left(\frac{2.17}{0.05}\right)^2 0.5^2 = 470.89 \ \ rounded\ up\ to\ n = 471.$$