

Section 5.4: Choosing the Sample Size

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- the precision of your estimate (confidence interval, say) is measured by the margin of error (or, equivalently, the width of your confidence interval)

\therefore when designing your sampling plan, choose sample size to ensure that you get the accuracy you want/need

Example: suppose you wish to estimate the mean time between failures for a certain brand of disk drive. From previous experience, you know that σ is in the neighborhood of 200 hours. If you want your estimate of the mean to be precise with 99% confidence to within ± 50 hours of the true value, how many disk drives will you need to test?

$$\text{MOE} \leq B \quad \leftarrow \text{bound: maximum margin of error}$$

$$\uparrow 50 \text{ hours}$$

$$Z_{\alpha/2} \frac{\sigma}{\sqrt{n}} \leq B$$

$$\frac{Z_{\alpha/2} \sigma}{B} \leq \sqrt{n}$$

$$n \geq \left(\frac{Z_{\alpha/2} \sigma}{B} \right)^2$$

$$Z_{\alpha/2} = 2.58$$

either from chart of
confidence levels or
normal table

$$\geq \left(\frac{2.58 \cdot 200}{50} \right)^2$$

$$\geq 106.502$$

$$\geq 107$$

(actually, I'd round
to 110, myself)

↑
round up!