- Error: ϵ
- Confidence: $1 - \delta$
- Sample size: n

- Error: ϵ 0.03

- Confidence: $1 - \delta$ $0.95 = 1 - 0.05$

- Sample size: n

0.01

0.03

- Error: ϵ

0.99 = 1 − 0.01

0.95 = 1 − 0.05

- Confidence: $1 - \delta$

- Sample size: n

0.05

0.01

0.03

- Error: ϵ

0.90 = 1 – 0.10

0.99 = 1 – 0.01

0.95 = 1 – 0.05

- Confidence: $1 - \delta$

- Sample size: n

What sample size n yields an error no more than ϵ with a confidence at least $1 - \delta$?

0.05
0.01
0.03

- Error: ϵ

$0.90 = 1 - 0.10$
$0.99 = 1 - 0.01$
$0.95 = 1 - 0.05$

- Confidence: $1 - \delta$
- Sample size: n

What sample size n yields an error no more than ϵ with a confidence at least $1 - \delta$?

The desired relation

$$\mathbf{P}\left\{p - \epsilon \leq \frac{S_n}{n} \leq p + \epsilon\right\} \geq 1 - \delta$$

0.05

0.01

0.03

- Error: ϵ

0.90 = 1 − 0.10

0.99 = 1 − 0.01

0.95 = 1 − 0.05

- Confidence: $1 - \delta$
- Sample size: n

What sample size n yields an error no more than ϵ with a confidence at least $1 - \delta$?

0.05
0.01
0.03

- Error: ϵ

0.90 = 1 − 0.10
0.99 = 1 − 0.01
0.95 = 1 − 0.05

- Confidence: $1 - \delta$
- Sample size: n

The desired relation

$$\mathbf{P}\left\{p - \epsilon \le \tfrac{S_n}{n} \le p + \epsilon\right\} \ge 1 - \delta$$

— or —

$$\mathbf{P}\left\{\left|\tfrac{S_n}{n} - p\right| \le \epsilon\right\} \ge 1 - \delta$$

What sample size n yields an error no more than ϵ with a confidence at least $1 - \delta$?

0.05
0.01
0.03

- Error: ϵ

0.90 = 1 − 0.10
0.99 = 1 − 0.01
0.95 = 1 − 0.05

- Confidence: $1 - \delta$
- Sample size: n

The desired relation

$$\mathbf{P}\left\{p - \epsilon \leq \frac{S_n}{n} \leq p + \epsilon\right\} \geq 1 - \delta$$

— or —

$$\mathbf{P}\left\{\left|\frac{S_n}{n} - p\right| \leq \epsilon\right\} \geq 1 - \delta$$

— or —

$$\mathbf{P}\left\{\left|\frac{S_n}{n} - p\right| > \epsilon\right\} \leq \delta$$

$$\mathbf{P}\left\{\left|\frac{S_n}{n} - p\right| > \epsilon\right\} \leq \delta$$

$$\mathbf{P}\left\{\left|\frac{S_n}{n} - p\right| > \epsilon\right\} \leq \delta$$

How are the error ϵ, the confidence $1 - \delta$, and the sample size n related?