

Section 8: cont'd

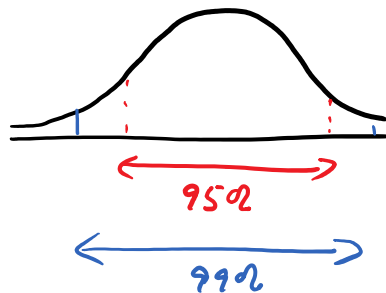
Wednesday, April 5, 2017 1:49 PM

recall from last time:

"With 95% confidence, the average volume of a can of Coke is between 354.7 mL and 355.9 mL"

② If we use the same σ , n , and \bar{x} from the previous question, would a 99% confidence interval be narrower or wider?

wider = $Z_{\alpha/2}$ would be larger for 99% than for 95%



intuitively, a wider interval gives us more confidence that we have captured the true mean μ in our interval

\therefore there is a trade-off between confidence and precision

a 100% CI would be from $-\infty$ to $+\infty$

a shortcut for CIs:

often, rather than using a normal table, we just look up $Z_{\alpha/2}$ on a chart:

confidence level \rightarrow

$1 - \alpha$	0.9	0.95	0.98	0.99
$Z_{\alpha/2}$	1.645	1.960	2.326	2.576
Z_{α}	1.282	1.645	2.054	2.326

③ 50 randomly selected Camosun students
searches/week: $\bar{x} = 23.4$
 $s = 3.7$

find a 90% CI for average searches among
Camosun students

$n \geq 30$ ✓

$$\mu = \bar{x} \pm \underbrace{Z_{\alpha/2} \frac{s}{\sqrt{n}}}_{\text{margin of error}}$$
$$= 23.4 \pm 1.645 \left(\frac{3.7}{\sqrt{50}} \right)$$

$$= 23.4 \pm 0.860761$$

$$= 23.4 \pm 0.9$$

← note: not
a CI
yet

90% CI : between 22.5 and 29.3 searches/week

④

thickness of sheet metal:

σ
2.7 mm

we want μ with 95% confidence to have a margin of error of less than 0.02 mm. What is the minimum sample size?

$$\mu = \bar{x} \pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

margin of error MOE

$$\text{MOE} \leq B \quad B = \text{band} = 0.02$$

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

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

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

$$\geq \left(\frac{1.96 \cdot 2.7}{0.02} \right)^2$$

$$\geq 70013.16$$

ROUND
UP

$$\geq 70014$$