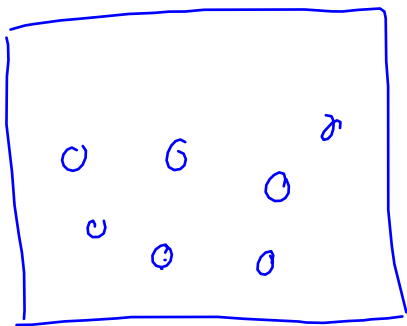
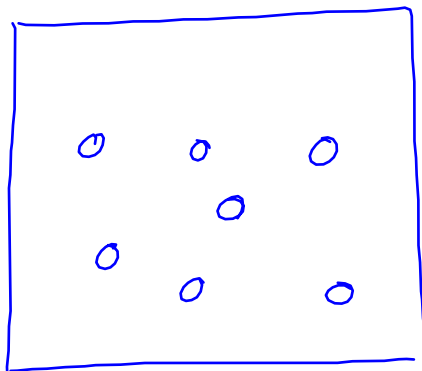


Section 10.2

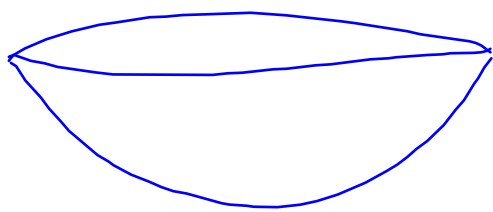


100 golf balls

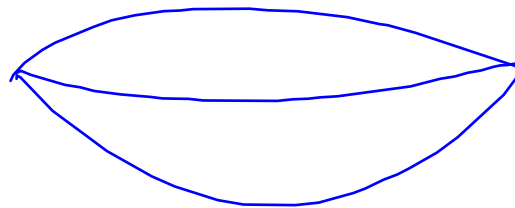


100 ping pong balls

$$\mu \longrightarrow \bar{\kappa}$$



Soup A



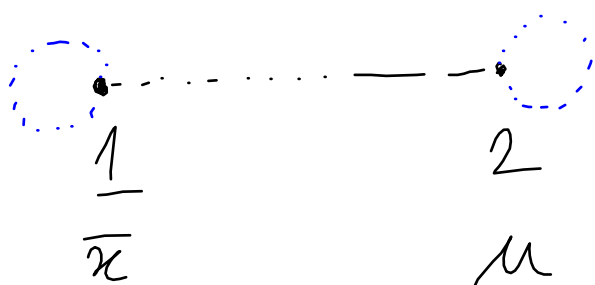
Soup B

$$\bar{\kappa} \longrightarrow \mu$$

$$\mu \rightleftarrows \bar{\kappa}$$

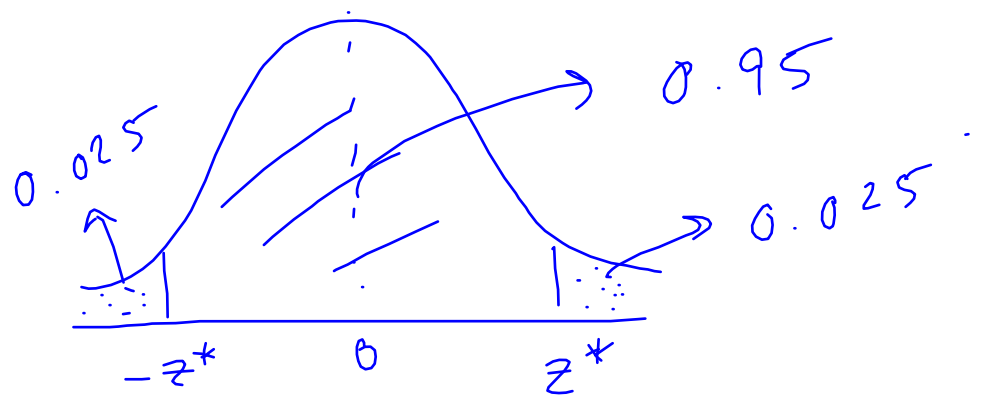
If $\bar{x}$ within a certain μ
 dist. from
 e.g. 100 miles

μ within same dist. $\bar{x}$
 from



If $\bar{x}$ close to μ 95% of the
 time
 μ " " $\bar{x}$ "

$$Z \sim N(0, 1)$$



$$P(-z^* < Z < z^*) = 0.95$$

$$P(-1.96 < \textcircled{Z} < 1.96) = 0.95$$

$$\bar{X} \sim N(\mu, \sigma/\sqrt{n})$$

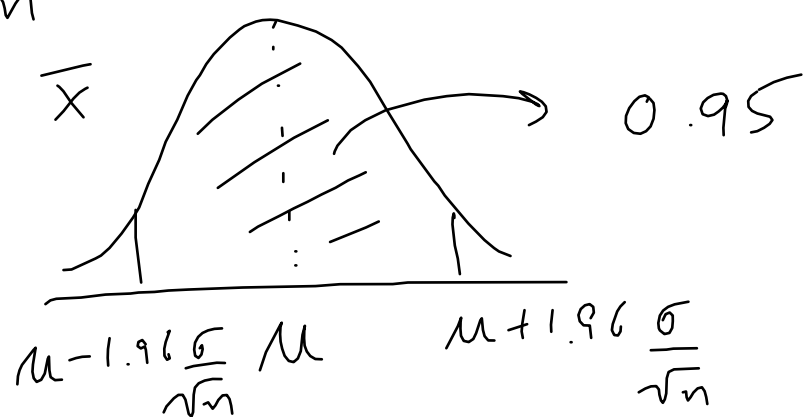
$$\frac{\bar{X} - \mu}{\sigma/\sqrt{n}} \sim N(0, 1)$$

$$P\left(-1.96 < \frac{\bar{X} - \mu}{\sigma/\sqrt{n}} < 1.96\right) = 0.95$$

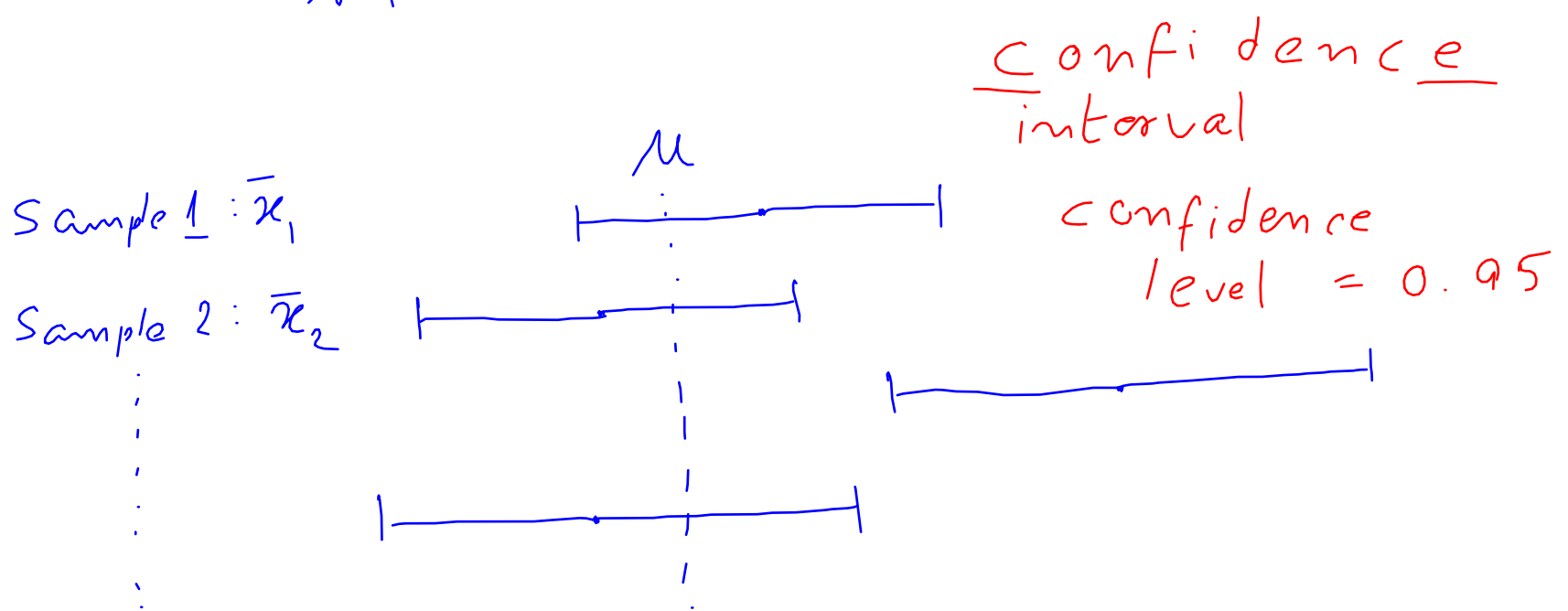
① Keep μ in center

② " $\bar{X}$ " "

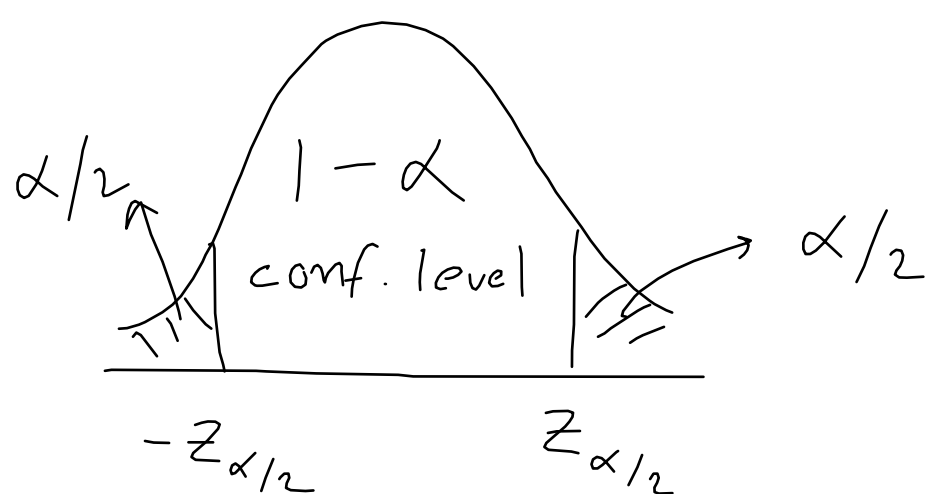
$$P\left(\mu - 1.96 \frac{\sigma}{\sqrt{n}} < \bar{X} < \mu + 1.96 \frac{\sigma}{\sqrt{n}}\right) = 0.95$$



$$P\left(\bar{X} - 1.96 \frac{\sigma}{\sqrt{n}} < \mu < \bar{X} + 1.96 \frac{\sigma}{\sqrt{n}}\right) = 0.95$$



$1.96 \frac{\sigma}{\sqrt{n}}$: margin of error / max. error.
($\bar{E}$)



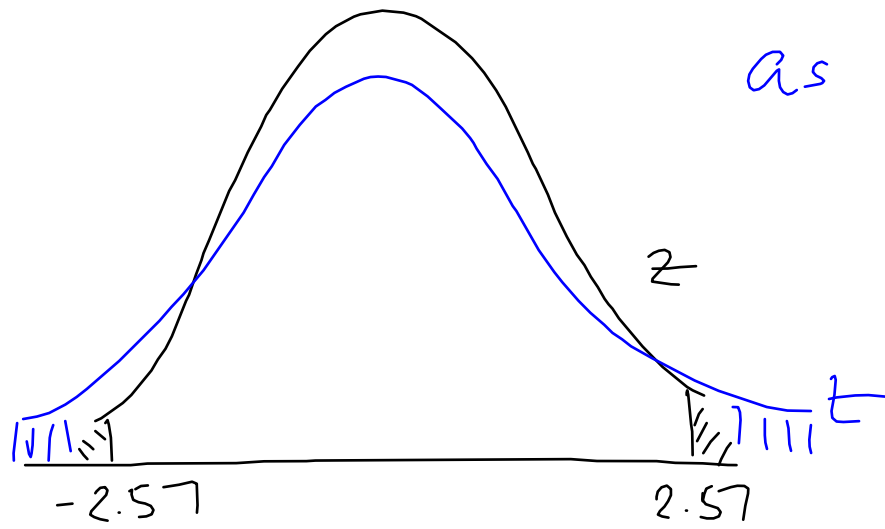
$$\bar{x} \pm z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}$$

Section 10.3

Similar to 10.2 except

σ unknown $\rightarrow$ use s
 $\downarrow$
 sample
 use t instead of z std. dev.

t has thicker tails than z

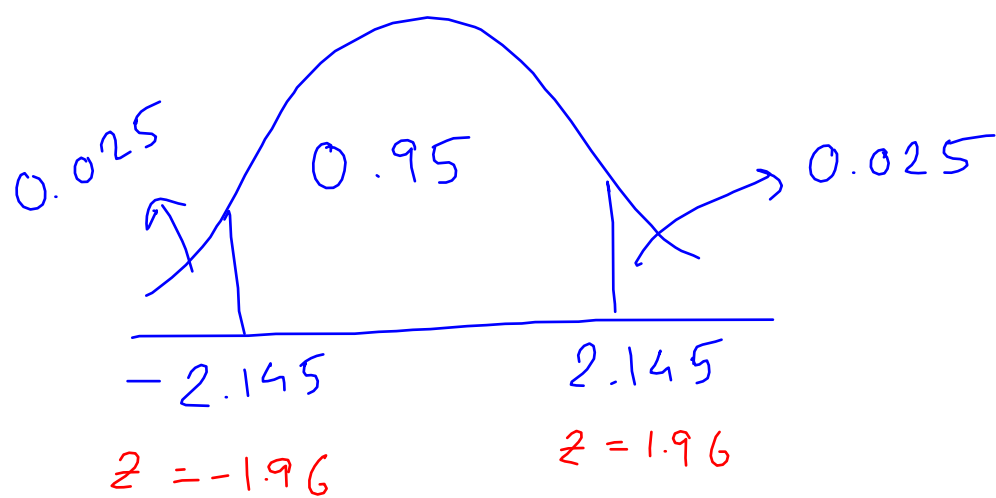


as $n \uparrow$

t increasingly resembles z .

degrees of freedom $\rightarrow df = n - 1$

confidence interval ; $1 - \alpha = 0.95$



$$\begin{aligned} n &= 15 \\ df &= 15 - 1 \\ &= 14 \end{aligned}$$

CI using t (2.145) $\Rightarrow$ wider

CI " z (1.96)

$$\hookrightarrow \bar{x} - z \cdot \frac{\sigma}{\sqrt{n}}, \quad \bar{x} + z \cdot \frac{\sigma}{\sqrt{n}}$$