

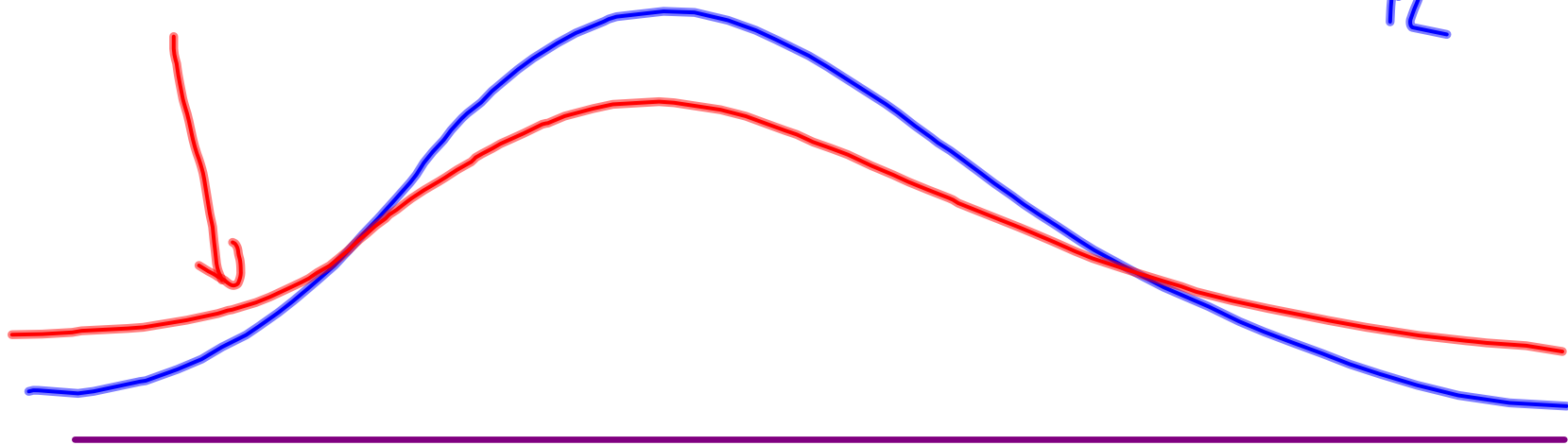
Reality - we don't know the standard deviation ( $\sigma$ )

We estimate the standard deviation using the sample

$$\frac{\sigma}{\sqrt{n}} \rightarrow \frac{s}{\sqrt{n}}$$

t-distribution

NORMAL



# T-Distributions

- symmetric, bell-shaped, NOT NORMAL
- degrees of freedom ( $n-1$ )  
↑ sample size
- the more d.f., the more normal it looks

That was then

$z^*$  for a confidence level

$$\bar{X} \pm z^* \frac{\sigma}{\sqrt{n}}$$

This is now

$t^*$  for confidence level  
AND d.f.

$$\bar{X} \pm t^* \frac{s}{\sqrt{n}}$$