

Section 5.5:

Tuesday, June 16, 2015
3:09 PM

student's t -distribution:

- used when sample size is small
- distribution shape depends on

$$\begin{aligned}df &= \text{degrees of freedom} \\ &= n - 1\end{aligned}$$

where n = sample size

- shape of distribution:

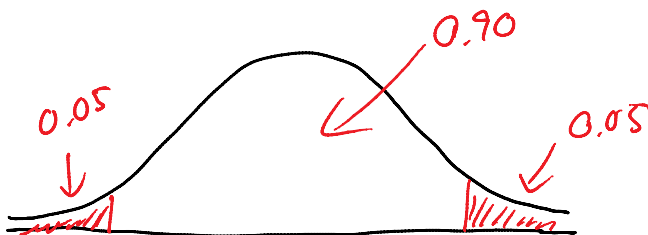
- mound-shaped
- centred at $t=0$

- but has more area in the "tails" than the normal distribution

- as $n \rightarrow \infty$, t -distribution approaches the normal distribution

note: cannot use t -distribution if your sample contains outliers!

90% confidence interval with a sample size of five:



$$t_{\alpha/2} = t_{0.05} = 2.132$$

$$\text{for } df = n - 1 = 4$$

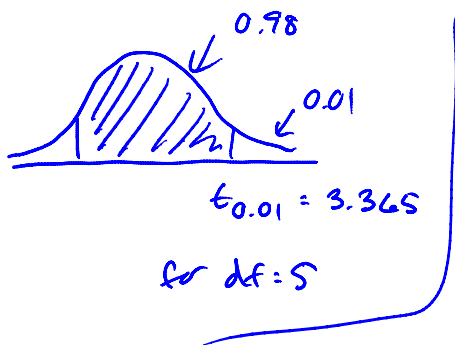
so then the confidence interval is calculated by

$$\mu = \bar{x} \pm t_{\alpha/2} \frac{s}{\sqrt{n}}$$

example: The duration for a random sample of 6 earthquakes in southern California has been measured to be:

1.1, 0.9, 1.5, 0.7, 1.4, and 1.3 minutes

This sample has a mean of 1.15 minutes with standard deviation 0.31 minutes. Give a 98% confidence interval for the duration of southern California earthquakes.



$$\mu = \bar{x} \pm t_{\alpha/2} \frac{s}{\sqrt{n}}$$

$$\mu = 1.15 \pm \frac{3.365 (0.31)}{\sqrt{6}}$$

$$= 1.15 \pm 0.425864$$

$$= 1.15 \pm 0.43$$

$$= 0.72 \text{ to } 1.58 \text{ minutes}$$

$$(0.7 \text{ to } 1.6 \text{ min})$$