Confidence Intervals

A $100(1-\alpha)\%$ CI for μ_Y is:

$$\bar{y} \pm \underbrace{z_{\alpha/2}}_{\text{critical value from a standard distribution (model)}} \cdot \underbrace{\frac{\sigma_Y}{\sqrt{n}}}_{\text{standard error}}$$

$\bar{y}$: point estimate

$\underbrace{\text{whole expression}}_{\text{margin of error}}$

But, in practice, we don't (usually) know σ_Y!

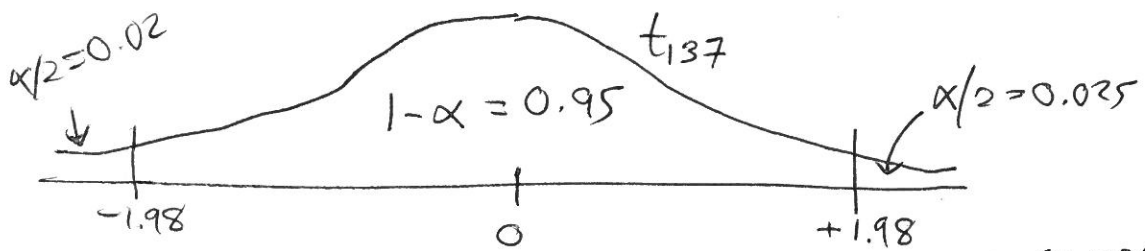
We estimate σ_Y using s_y (the sample standard deviation) & use Student's t distribution instead of Z (the standard normal distribution)

A $100(1-\alpha)\%$ CI for μ_Y with σ_Y unknown, but estimated using s_y is:

$$\bar{y} \pm t_{n-1,\alpha/2} \cdot \frac{s_y}{\sqrt{n}}$$

So, in our example $\bar{y} = 0.05474$, $s_y = 0.3241$

$n = 138$, $\nu = n-1 = 137$, $\alpha = 0.05$ i.e. 95% CI



So, a 95% CI for μ_Y is $0.05474 \pm (1.978)\left(0.3241/\sqrt{138}\right)$

$= 0.05474 \pm 0.05455 \doteq (0.00018, 0.1093)$

Model is just $Y = \beta_0 + \varepsilon$ with estimated (fitted) model $\hat{Y} = \bar{y}$