8-6 TESTS FOR σ, σ^2

$X \underset{}{\overset{\text{very close}}{\sim}}$ Normal

We'll only do Method 3 (Traditional).

Ex A women's college goes coed.
We know women's heights have a SD of 2.5 in. at the college.
A sample of 20 men's heights has a SD of 2.8 in.

1. Use $\alpha = 0.05$ to test the claim that men's heights and women's heights at the college have different variances. A

Let σ^2 = the variance of men's heights at the college.

$H_0: \sigma^2 = \underbrace{(2.5)^2}_{\text{Careful! SD vs. VAR.}} = \underbrace{6.25}_{\text{the variance for women}}$

$H_A: \sigma^2 \neq 6.25$

⇓

Two-tailed test

$\alpha = 0.05$

Key sample stat: $s^2 = (2.8)^2 = 7.84$

$n = 20$

Test stat

$$\chi^2 = \frac{(n-1)s^2}{\sigma^2} \leftarrow \text{under } H_0 \text{ (Know this)}$$

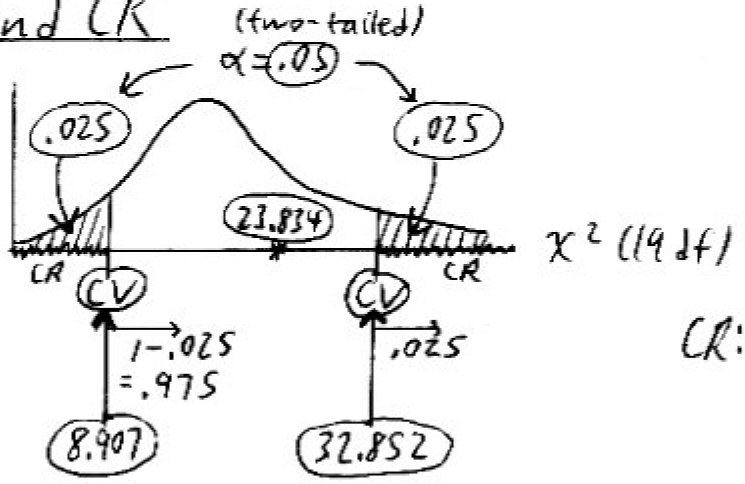
Given on tests

$$= \frac{(20-1)(7.84)}{6.25}$$

$$\approx 23.834$$

$\#df = n-1 = 20-1 = 19\ df$

CVs and CR



CR: "Danger Zone" for H_0

Decision

23.834 is not in the CR, so we do not reject H_0.

Final Conclusion (F.C.)

There is insufficient evidence in support of the claim that Ⓐ.

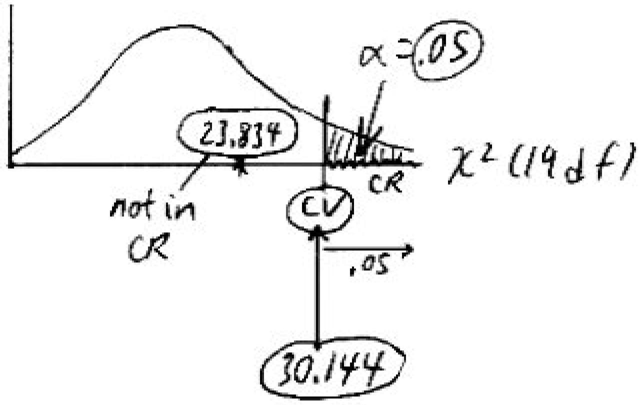
② Use $\alpha = 0.05$ to test the claim that men's heights vary more than women's heights at the college.

What's the only diff from ①?

$H_0: \sigma^2 = 6.25$
$H_A: \sigma^2 > 6.25$
$\alpha = 0.05$

As before, $s^2 = 7.84$
$n = 20$
Test $\chi^2 \approx 23.834$, 19 df.

CV and CR

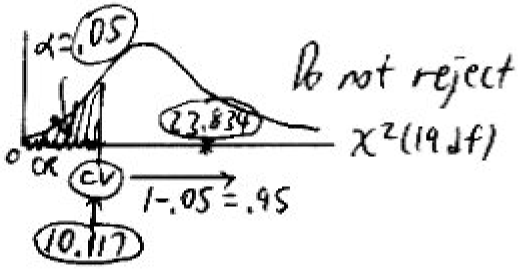


We do not reject H_0.
F.C.: ....

Note: For a given α, you may reject H_0 in a one-tailed test but not in a two-tailed test!

③ Left-tailed test (What's new?)

Claim
$H_A: \sigma^2 < 6.25$



Do not reject H_0.