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4-29

Hypothesis test for σ^2

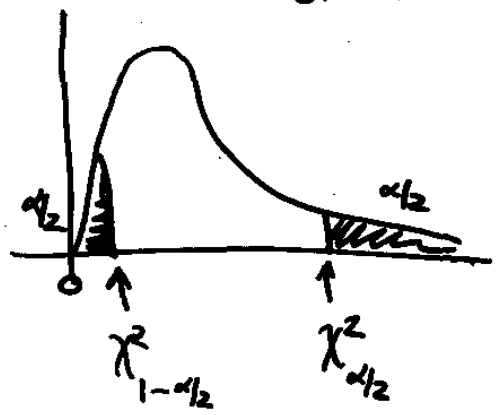
$H_0: \sigma^2 = \sigma_0^2$	$H_0: \sigma^2 \leq \sigma_0^2$	$H_0: \sigma^2 \geq \sigma_0^2$
$H_1: \sigma^2 \neq \sigma_0^2$	$H_1: \sigma^2 > \sigma_0^2$	$H_1: \sigma^2 < \sigma_0^2$

Test stat $= \chi^2 = \dfrac{(n-1)s^2}{\sigma_0^2}$

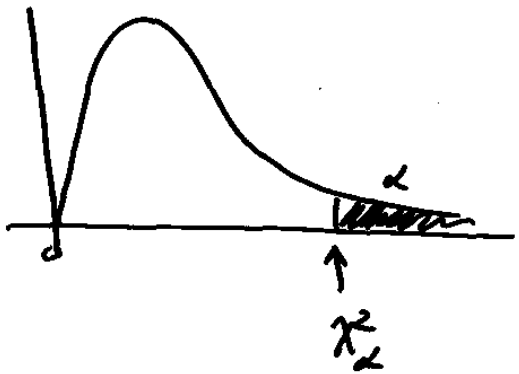
Critical values:

$df = n-1$

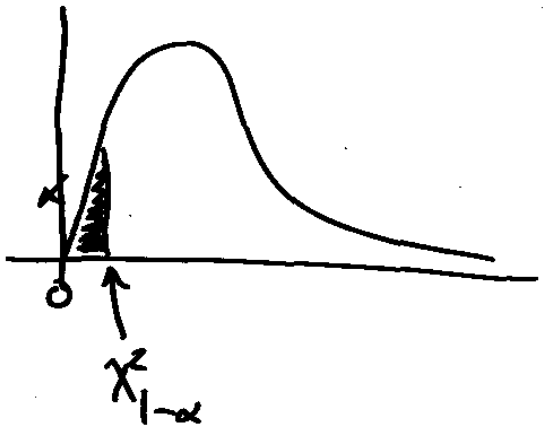
2-sided test



Upper 1-sided test



Lower 1-sided test



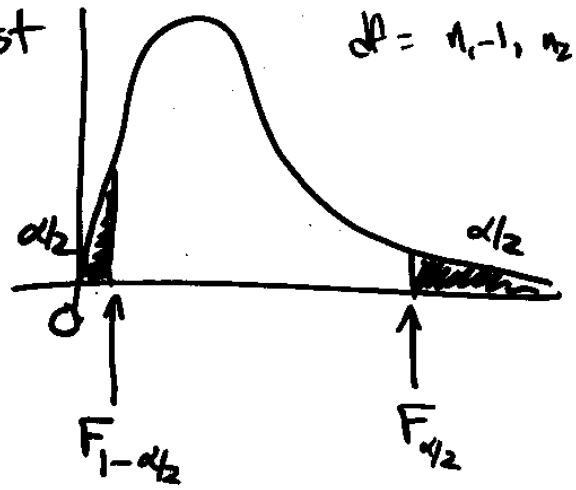
Hypothesis test for 2 variances

$H_0: \sigma_1^2 = \sigma_2^2$	$H_0: \sigma_1^2 \leq \sigma_2^2$	$H_0: \sigma_1^2 \leq \sigma_2^2$
$H_1: \sigma_1^2 \neq \sigma_2^2$	$H_1: \sigma_1^2 > \sigma_2^2$	$H_1: \sigma_1^2 > \sigma_2^2$

Test stat $= F = \dfrac{s_1^2}{s_2^2}$

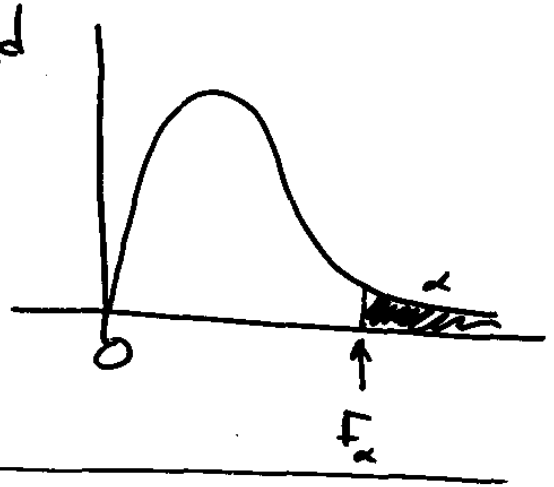
2-sided test

$df = n_1 - 1,\ n_2 - 1$

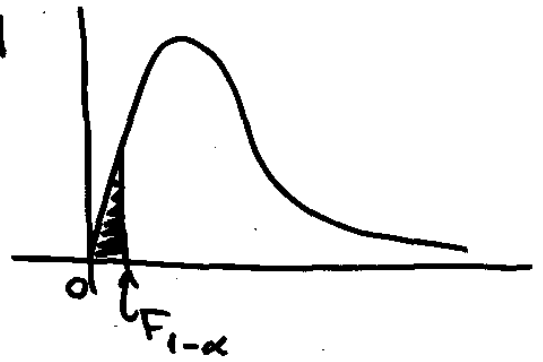


Trick: $F_{1-\alpha,\ v_1, v_2} = \dfrac{1}{F_{\alpha, v_2, v_1}}$

Upper 1-sided



Lower 1-sided



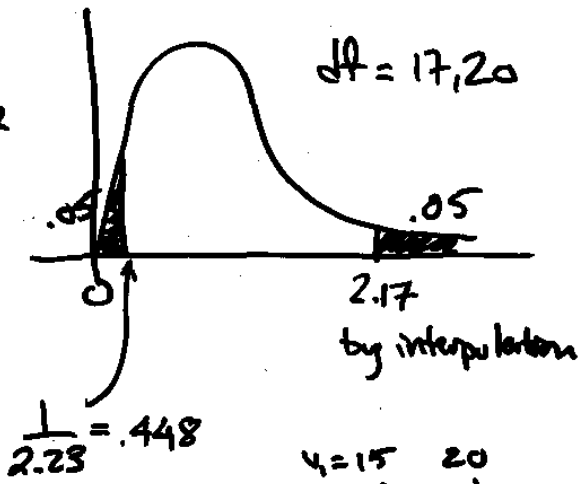
Example: $n_1 = 18$ $n_2 = 21$

$s_1 = 18$ $s_2 = 15$

Test for a difference between the population variances at $\alpha = .1$

$H_0: \sigma_1^2 = \sigma_2^2$

$H_1: \sigma_1^2 \neq \sigma_2^2$



$v_1 = 15$	20
$v_2 = 20$ 2.20	2.12

Test stat $= F = \frac{s_1^2}{s_2^2} = \frac{18^2}{15^2} = 1.44$

Accept H_0. We were unable to detect a difference.

Midterm exam on Tuesday.

Bring 1 page of notes ($8\frac{1}{2} \times 11$", front + back)

Bring z, t, χ^2, F tables

Bring a calculator

C.I.s for $\mu, p, \mu_1 - \mu_2, p_1 - p_2, \mu_d, \sigma^2$

sample size determination

H.T.s for $\mu, p, \mu_1 - \mu_2, p_1 - p_2, \mu_d, \sigma^2, \sigma_1^2/\sigma_2^2$

sample size, power

Maximum likelihood estimator

All of Chapter 9, plus 10.1 – 10.13