Statistical test

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April 20th 2017

Description of the project

Generate

$$X_{1,1}, X_{1,2}, X_{1,3}, \ldots, X_{1,n}$$

$$\vdots$$

$$X_{r,1}, X_{r,2}, X_{r,3}, \ldots, X_{r,n}$$

for a normally distributed random variable X and some r,n.
Calculate sample variances $S_1^2, \ldots, S_r^2$.
Test homoscedacity for significance level α, for some α.
Use the proposed statistical test:

$$F = \frac{\sum_{i=1}^{r} S_{(i)}^2 \frac{2i-1}{r}}{\sum_{i=1}^{r} S_i^2}$$
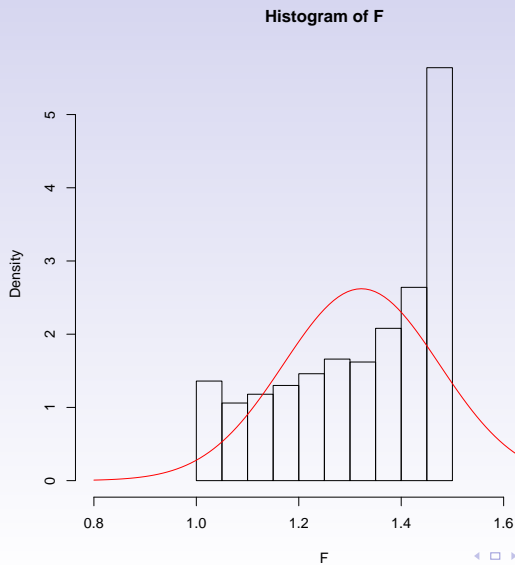
- $X - N(0, 1)$
- $n = \{2, 3, 4, \ldots, 9, 10, 12, 14, \ldots, 18, 20, 25, 30, 40, 60\}$
- $r = \{2, 3, 4, \ldots, 9, 10, 15, 20\}$
- $\alpha = \{1\%, 5\%, 10\%\}$

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How many times should we generate the random variables?
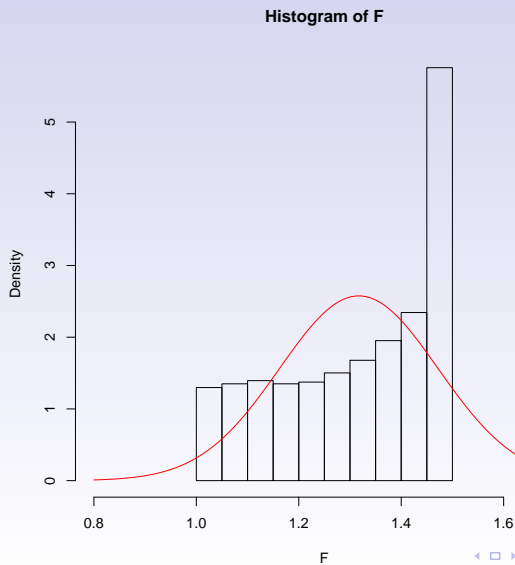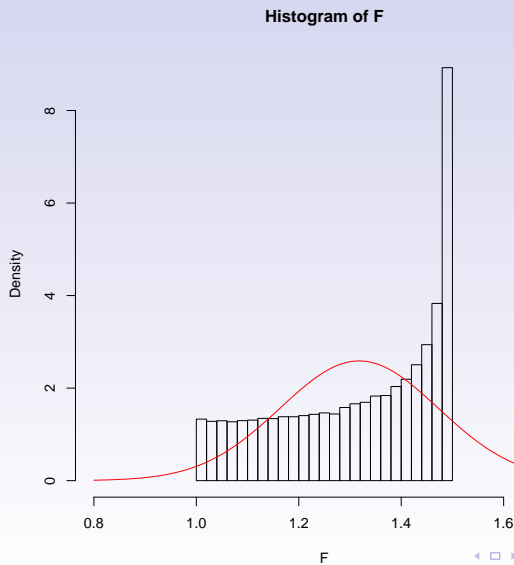How long will this take?

Loops

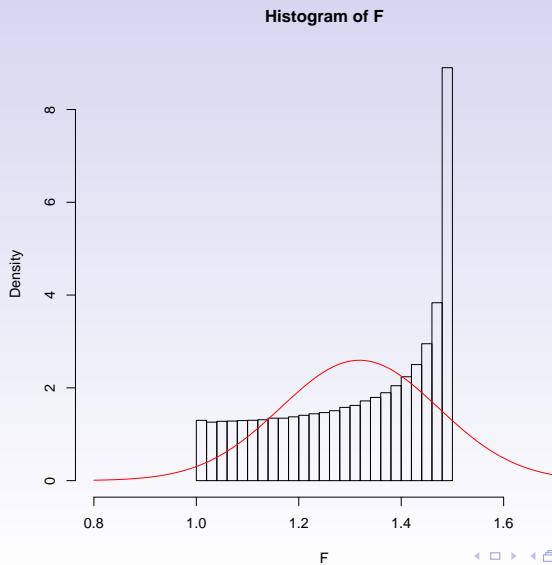$n = 2, r = 2$:

Histogram of F

Loops

$n = 2, r = 2$:

Histogram of F

Loops

$n = 2$, $r = 2$:

Histogram of F

Loops

$n = 2$, $r = 2$:

Histogram of F

- $n = 2, r = 2$: $15, 06s$
- $n = 2, r = 20$: $19, 22s$
- $n = 10, r = 20$: $69, 25s$
- $n = \{2, \dots, 10\}, r = \{1, \dots, 10\}$: $2123, 33s - 35min$

- **Main goal:** Generate three tables of the proposed statistical test
- **Work done so far:** One generated table
- **Plans:**
    - Generate the other two tables
    - Compare the test to a well known test (F-test)
    - Improve the test (if time permits)