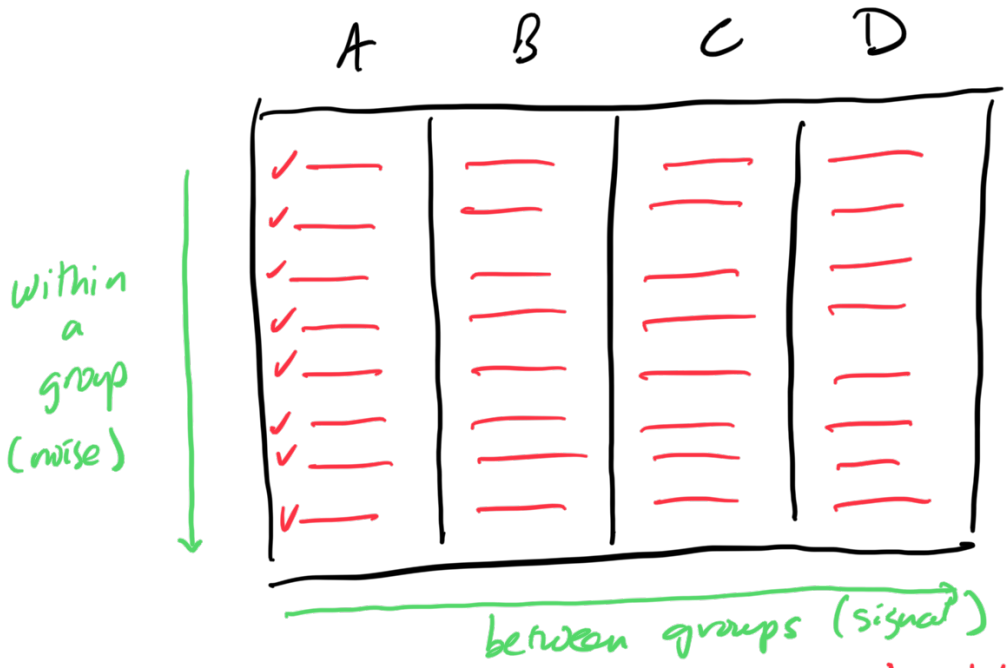
Physics 341 - Lecture 22

Assignment 5

→ Raw Data from an experiment.



"perfect world" → NULL HYPOTHESIS
- all data pts. to be The

save.

$SS_{treatment}$, SS_{error}, SS_{total}

→ Summary Statistics

$\bar{x}_A$, $\bar{x}_B$, $\bar{x}_C$, $\bar{x}_D$ } common.

$SS_{trt.}$, SS_{error} ?

MS_{trt}, MS_{error} ?

Q1.

N_{dof}^{trt}

N_{dof}^{error} } Step 1

N_{dof}^{total}

A B C D

$a = 4$

$N = an = 12$

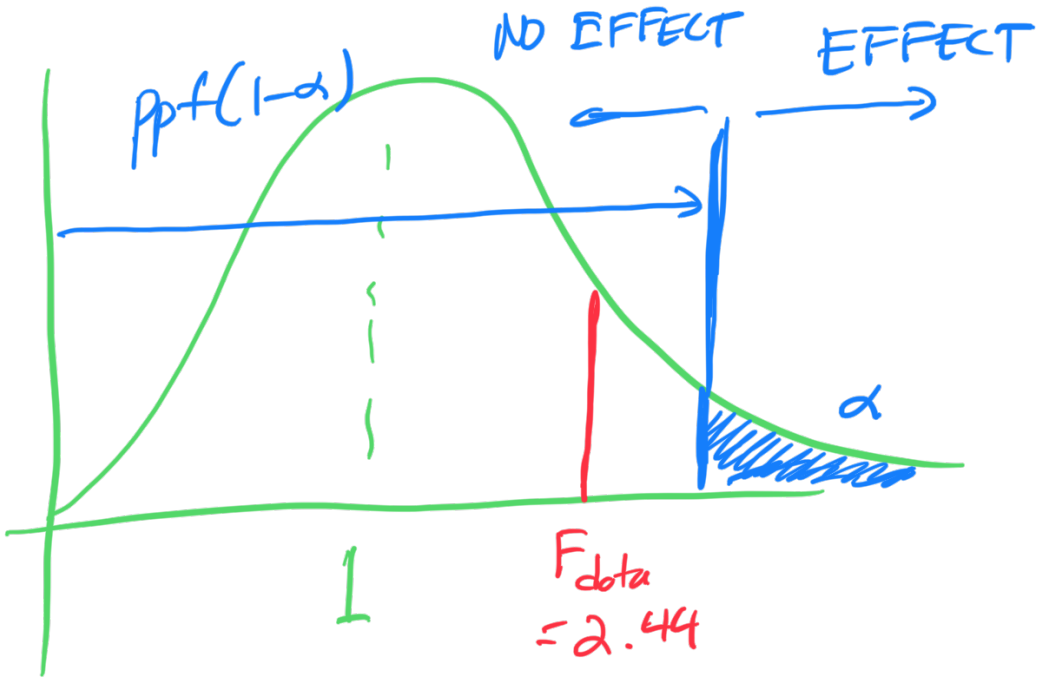
$n = 3$

$N_{dof}^{total} = 12 - 1 = 11$

$N_{dof}^{trt} = a - 1 = 4 - 1 = 3$

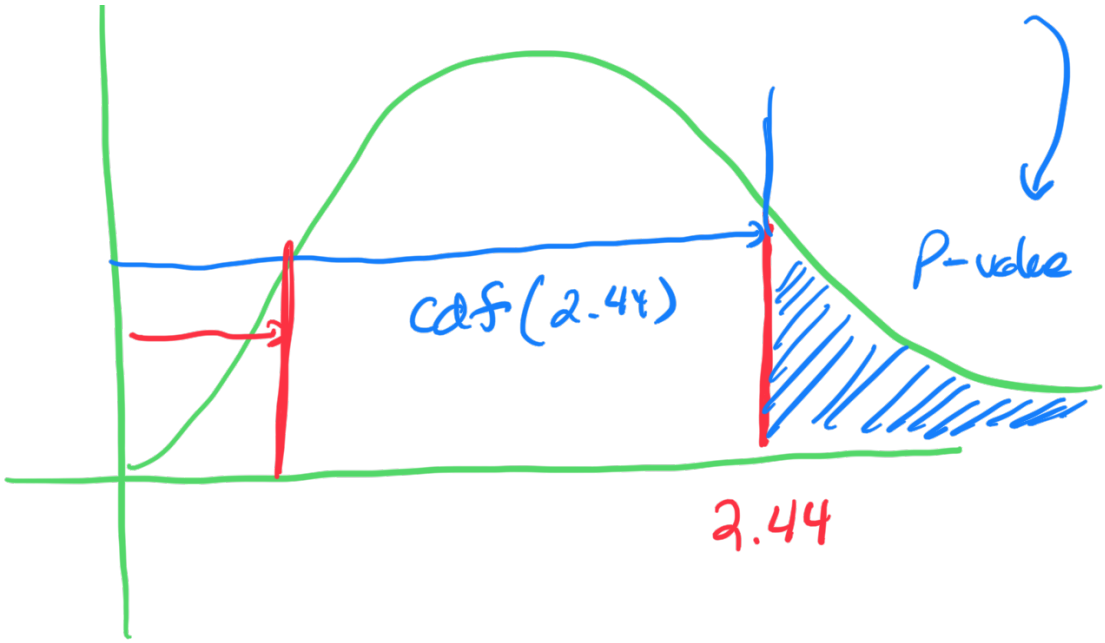
$N_{dof}^{error} = 11 - 3 = 8$ ✓

$F_{s/n} \equiv \frac{MS_{treatment}}{MS_{error}}$ ✓

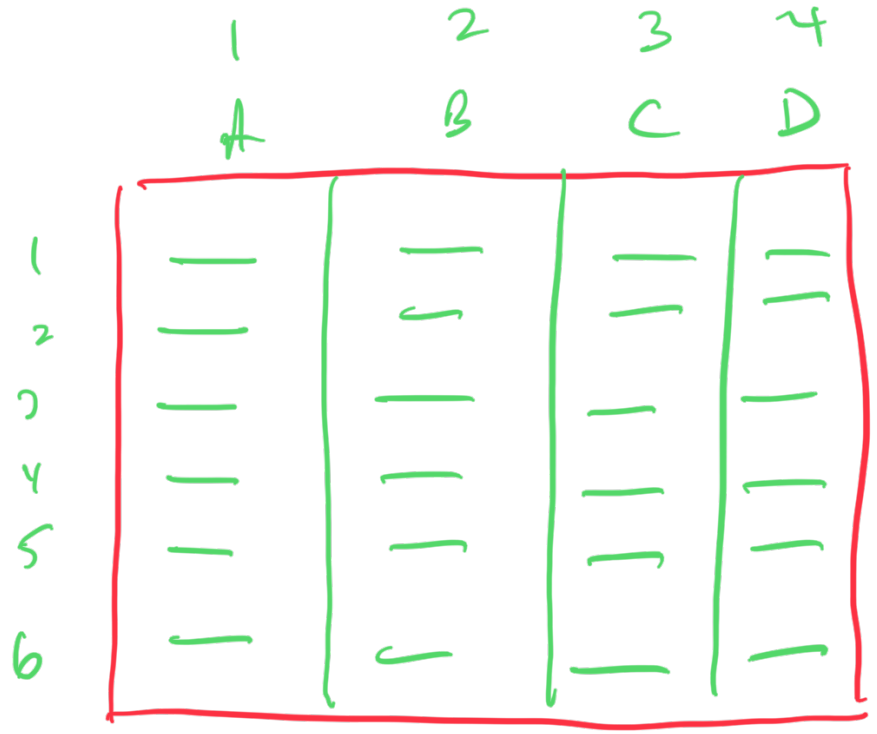


Fail to reject null hypothesis!

1 − cdf(2.44)



Q2.



$a = 4$

$n = 6$

$N = 24$ $\quad N_{dof}^{trt} = 23$

$N_{dof}^{trt.} = 4 - 1 = 3$

$$N_{dof}^{error} = \boxed{20}$$

(i) $\bar{x}_1, \bar{x}_2, \bar{x}_3, \bar{x}_4$

$\bar{\bar{x}}$

$$SS_{TRT} = \sum_{i=1}^{a} n\left(\bar{x}_i - \bar{\bar{x}}\right)^2$$

$$SS_{TOTAL} = N_{dof}^{tot} * var(\quad)$$

$$SS_{ERROR} = SS_{TOTAL} - SS_{TRT}$$

$\vdots$

f , f_{crit}

$\vdots$

(ii) ANOVA package from statsmodel

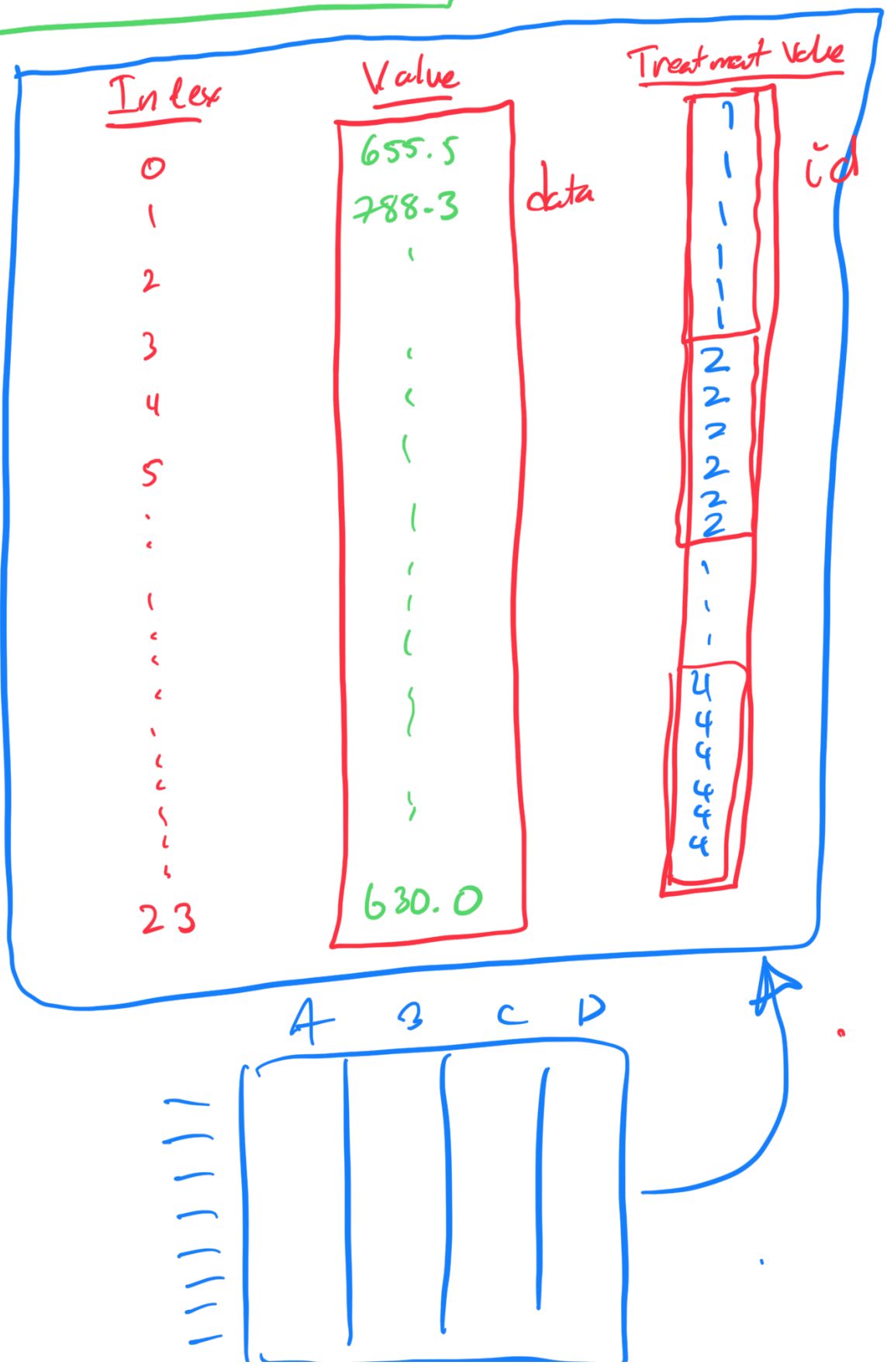
Step 1 → make the data fit the form that the package wants.

Step 2 → use package.

Pandas

Data Frame.

Stats Model ANOVA



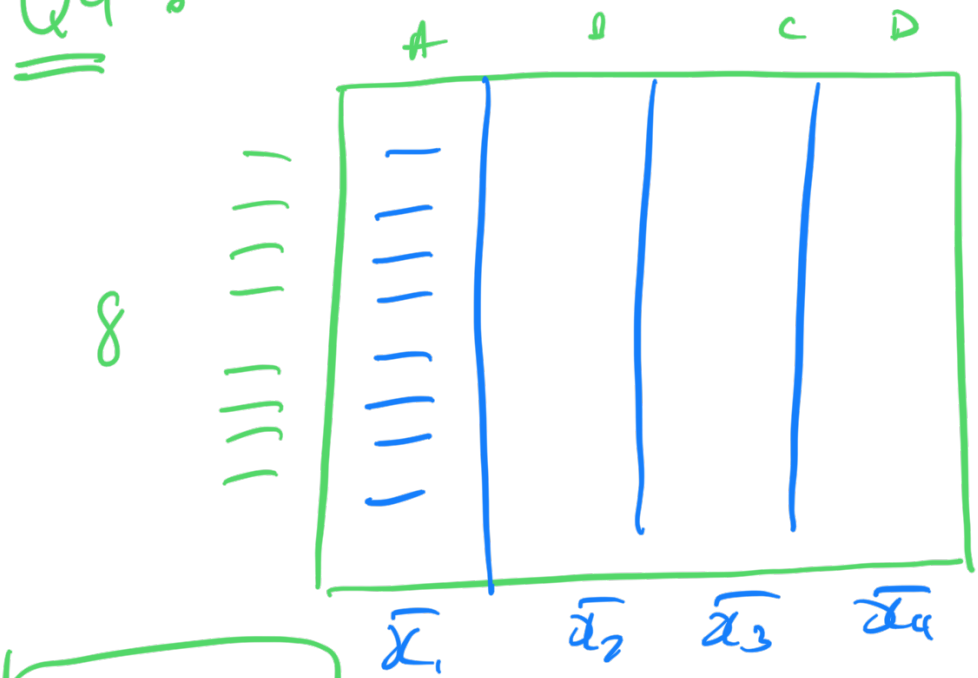
data = (.....)

Id = (.....)

Q3. $a = 3$

$n = 9$

Q4 :



$a = 4$

$n = 8$

$x1. \rightarrow \bar{x}_1$

$x2. \rightarrow \bar{x}_2$

$x3. \rightarrow \bar{x}_3$

$x4. \rightarrow \bar{x}_4$

$x.. \rightarrow \bar{\bar{x}}$

$\sum\sum x_{ij}2 \rightarrow \sum_{i=1}^{a}\sum_{j=1}^{n} x_{ij}^2$

Sum of squares of each data pt.

$$(a-b)^2 = a^2 - 2ab + b^2$$

$$SS_{TREATMENT} = \sum_{i=1}^{a} (\bar{x}_i - \bar{\bar{x}})^2 \cdot n$$