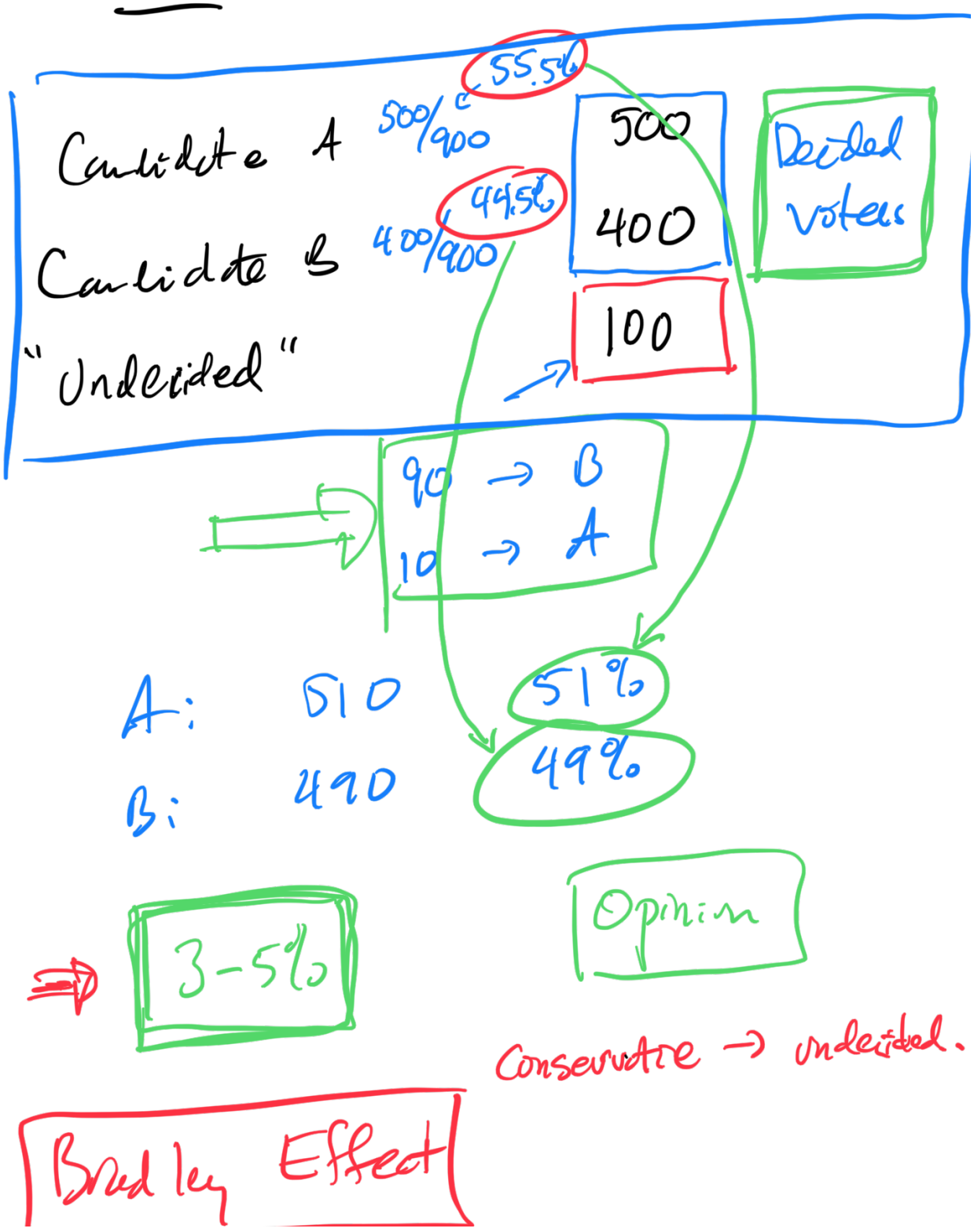
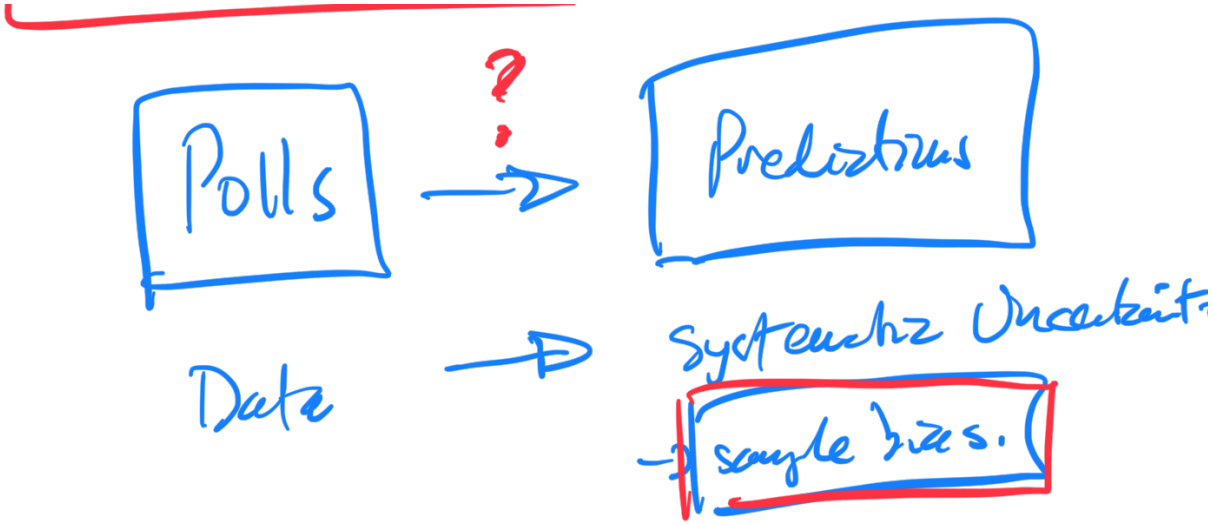
Poll

1000 people.





Question 10 → One-Way ANOVA

1 factor

	1	2	3	4
$\bar{x}$	4.39	4.52	5.49	6.36

$\bar{\bar{x}}$ 5.19 ?

$\sum_i \sum_j x_{ij}^2 = 911.91$

YES!

Is there an effect ?

Step 1 :

$a = 4$ $\quad N = 32 \quad N_{dof}^{total} = 31$

$n = 8$

$N_{dof}^{treatment} = a - 1 = 3$

$N_{dof}^{error} = 28$

$$SS_{TREATMENT} = \sum_i n(\bar{x}_i - \bar{\bar{x}})^2$$

$$MS_{TREATMENT} = SS_{TREATMENT} / N_{dof}^{TRT}$$

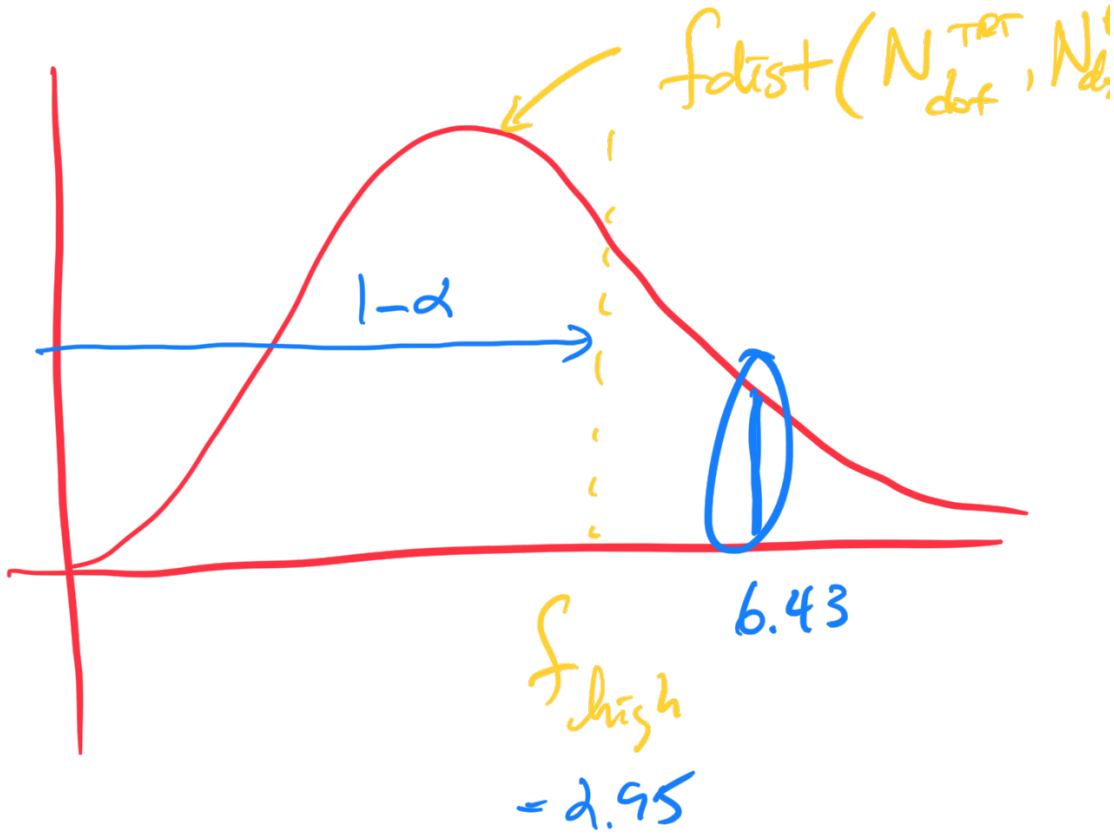
$$SS_{TOTAL} = \underbrace{\sum_i \sum_j x_{ij}^2}_{\checkmark} - N \cdot \bar{\bar{x}}^2$$

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

$$\cap \qquad MS_{TREATMENT}$$

$$f_{SN} = \frac{\quad}{MS_{ERROR}}$$

(6.43,



Step 2: What is the effect?

$\bar{x}_1$ vs. $\bar{x}_4$

$\bar{x}_2$ vs. $\bar{x}_4$

$\bar{x}_3$ vs. $\bar{x}_4$

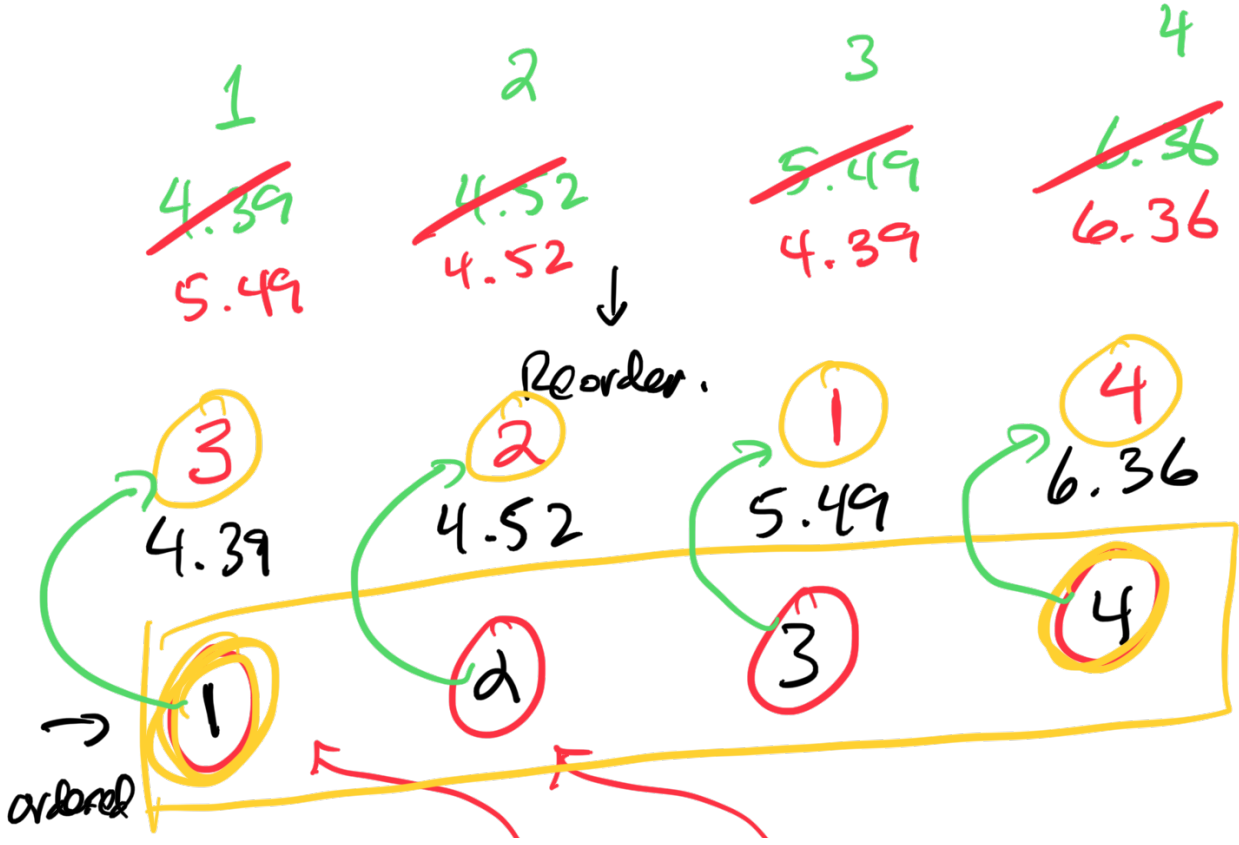
⋮

$\boxed{\text{Tukey's HSD}}$

q - tukey.py

(i) std-error $\equiv \sqrt{\frac{MS_{error}}{n}}$

(ii) Order the means from smallest to largest.



index

$\bar{x}_1$ $\bar{x}_2$

(iii) $q(k, N^{error}_{dof}, \alpha)$

28 .05

$\boxed{k = 2, 3, 4}$

$q[0], q[1], q[2]$

(iv) $W \equiv$ max difference between smallest and largest.

$= q(4) * \text{std\_error}$

$q[2]$

$\bar{x}_4 - \bar{x}_1$

$\cancel{\bar{x}_1 - \bar{x}_4}$

actual diff

$$diff = \frac{x_j - x_i}{\text{std\_error}}$$

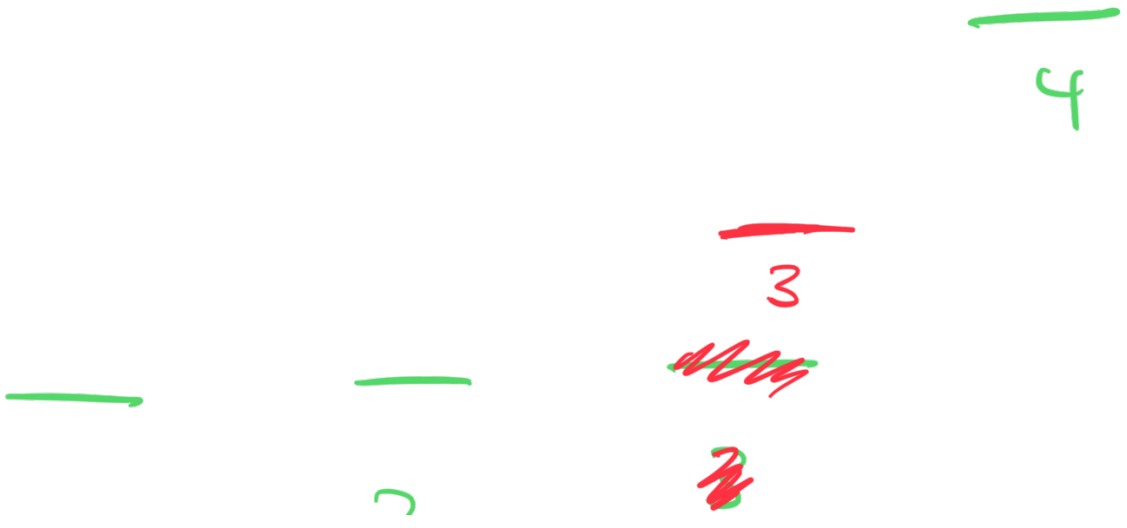
$\equiv$ actual # of error bars

$$diff\_comp = q[j - i - 1]$$

$4 - 1 - 1 =$

4 vs. 1 → $q[2$

2 vs. 1

$2 - 1 - 1 = 0$ ✓

$q[0]$