Physics 341 - Lecture 23

$$N^{dof}_{total} = N - 1 = an - 1$$

$$N^{dof}_{treatment} = a - 1$$

$$N^{dof}_{error} = N^{dof}_{total} - N^{dof}_{treatment}$$

$$SS_{TOTAL} = (N-1) * VAR(\ldots)$$

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

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

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

MS

$$MS_{TRT} = \frac{SS_{TRT}}{N_{TRT}^{df}}$$

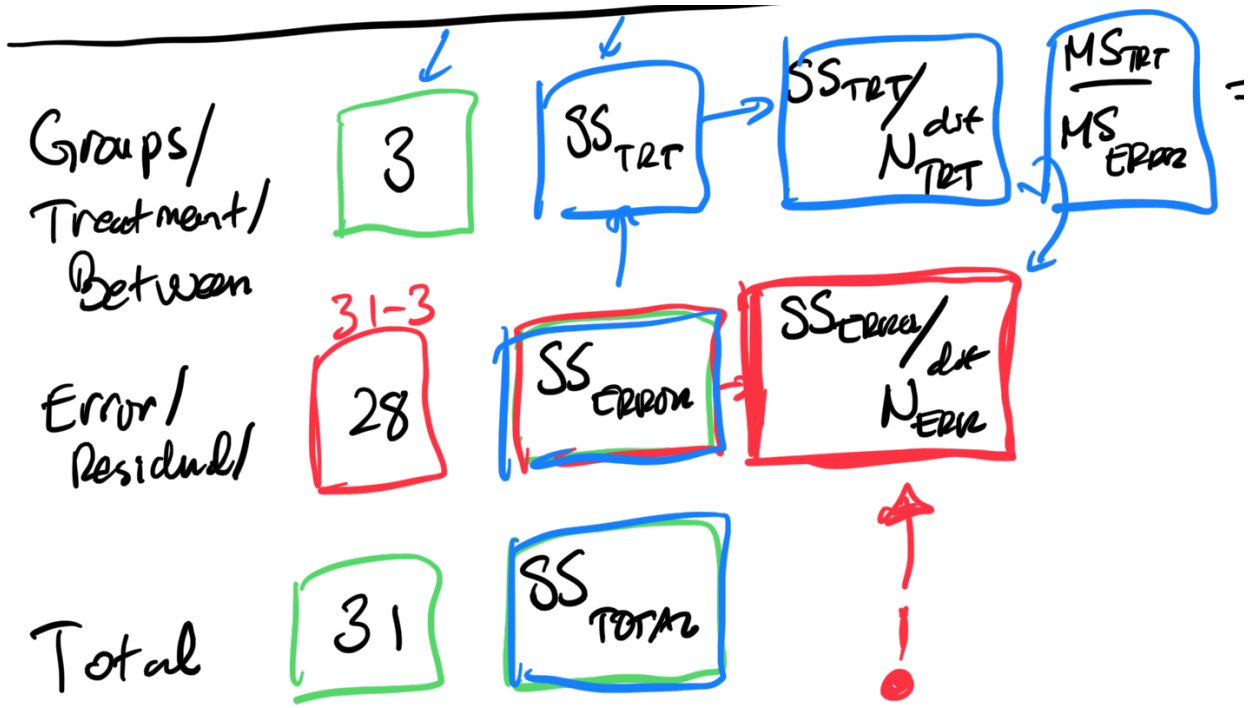
$$MS_{ERROR} = \frac{SS_{ERROR}}{N_{ERROR}^{df}}$$

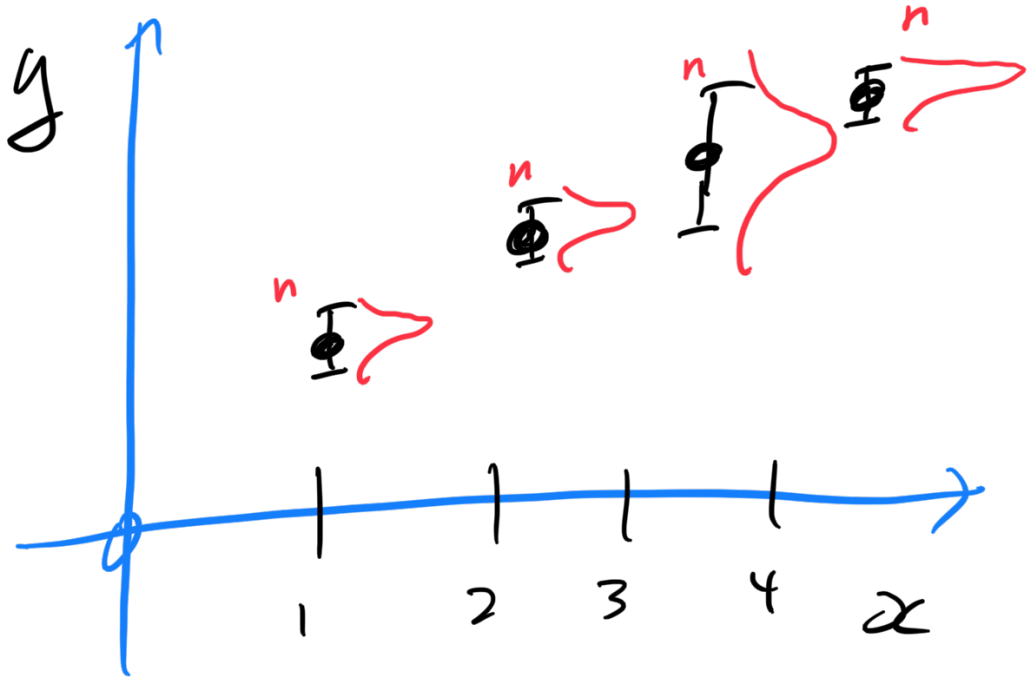
$f_{s/w}$

$$f_{s/w} = \frac{MS_{TRT}}{MS_{ERROR}}$$

ANOVA TABLE

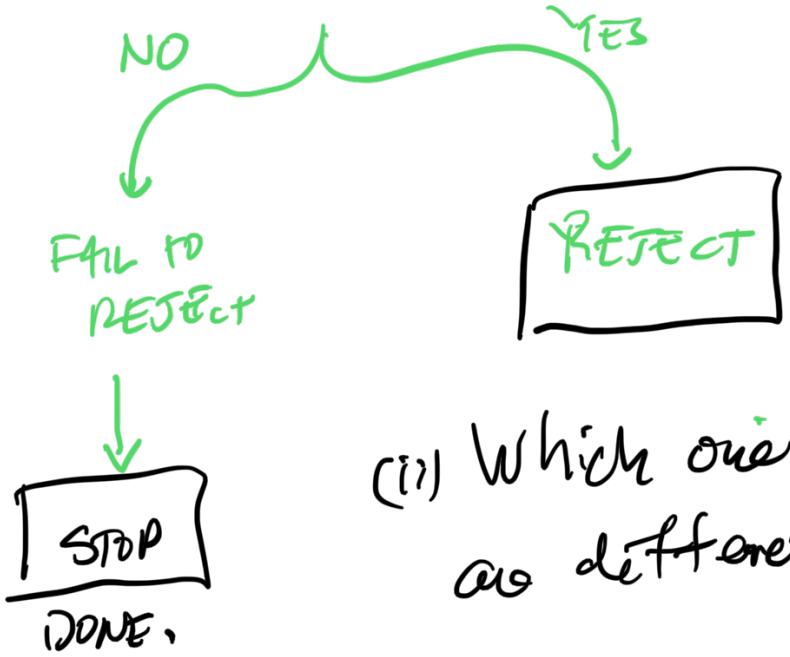
Source	df	SS	MS	f



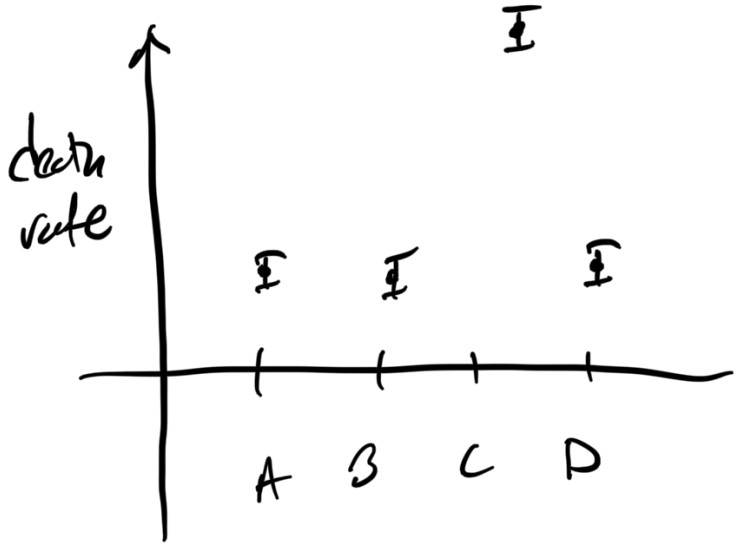


What do we do next ?

(i) Are the different settings different?

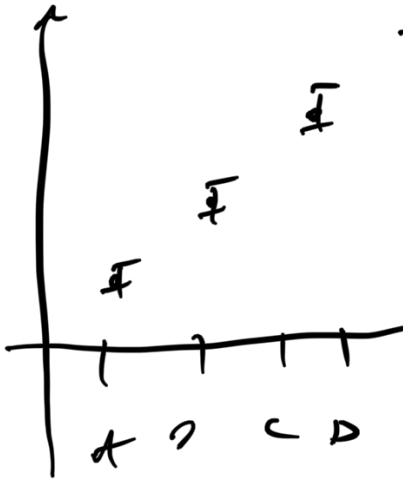


(ii) Which ones are different?



NOT ALL THE SAME

VS.



NOT ALL THE SAME

PLOT THE DATA!

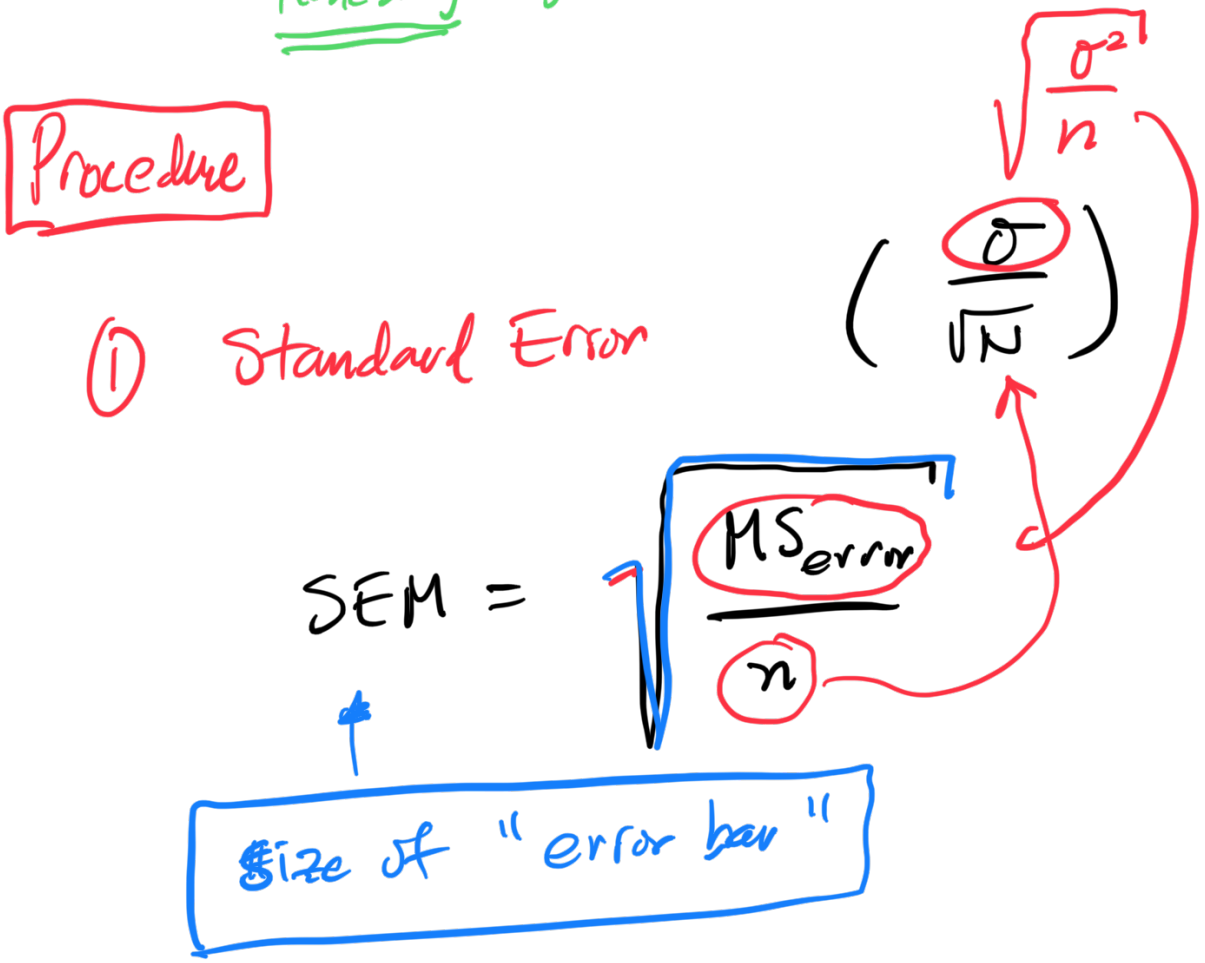
→ PLOT THE ...

Tukey's HSD Test.

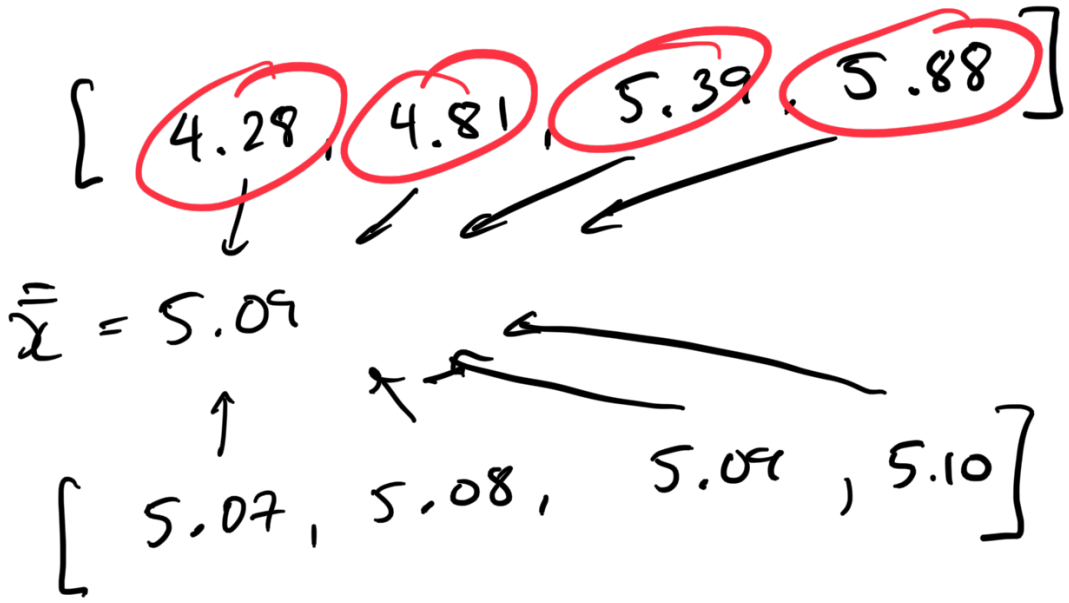
Honestly Significant Difference.

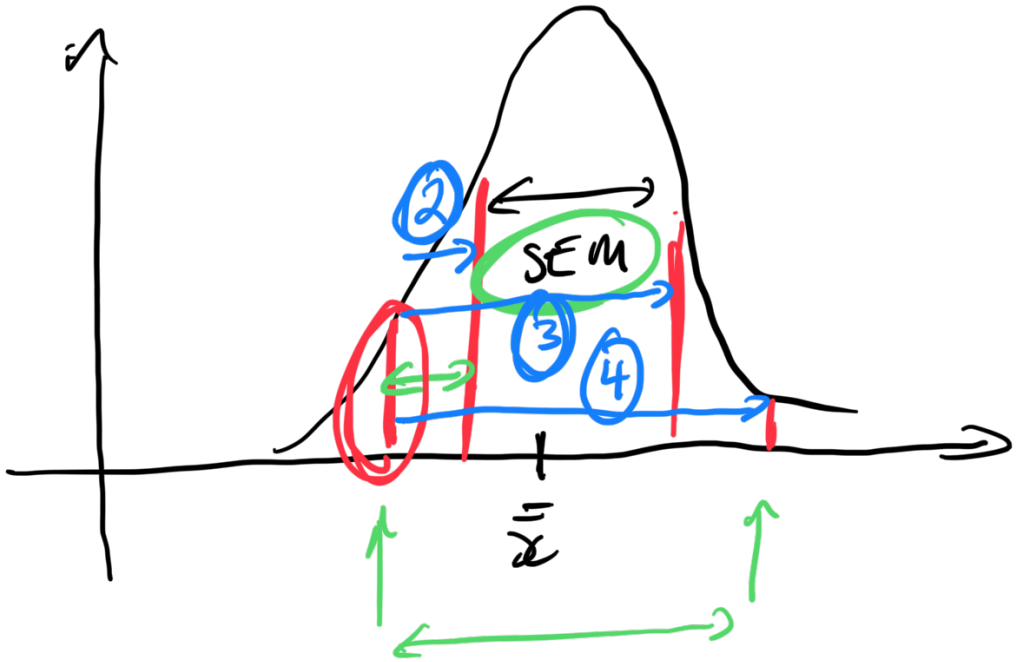
Procedure

① Standard Error



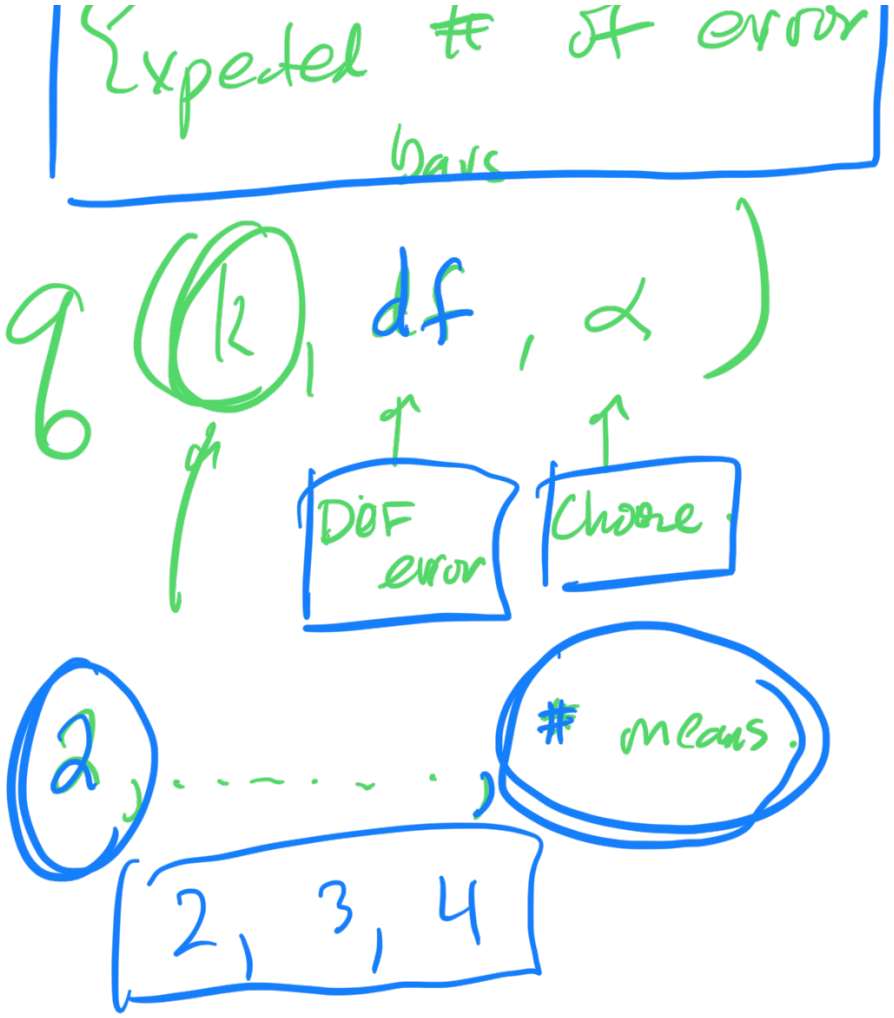
② Order the means from smallest to largest.





Gossett

(3) Studentized Range q value.



(4) W ← max. expected diffrace between webassign. largest and smallest.

q(4) * std_error

(5) Pairwise Comparisms.

q(2)
q(3) ←
q(4)

1, 2, 3, 4

smallest — largest

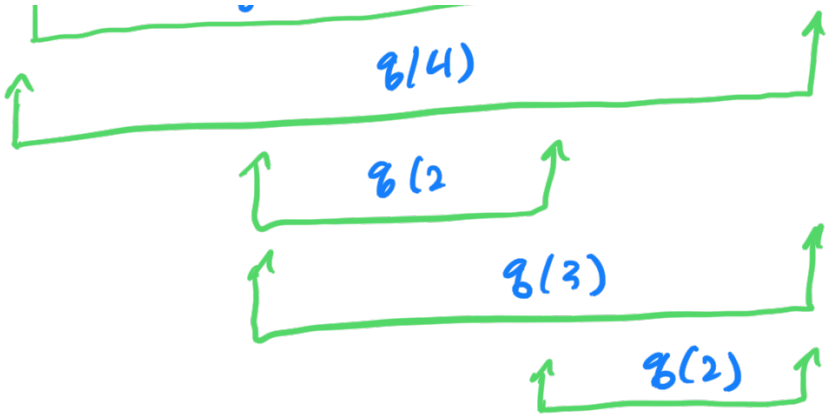
			Actual	Expected
1	vs.	4	$\bar{x}_4 - \bar{x}_1$	$q^{(4)} * \text{std}$ er
1	vs.	3	$\bar{x}_3 - \bar{x}_1$	$q^{(3)} * \text{std.}$
1	vs.	2	$\bar{x}_2 - \bar{x}_1$	$q^{(2)} * \text{std-}$ em
2	vs.	4	$\bar{x}_4 - \bar{x}_2$	$q^{(3)} * -$
2	vs.	3	$\bar{x}_3 - \bar{x}_2$	$q^{(2)} * -$
3	vs.	4	$\bar{x}_4 - \bar{x}_3$	$q^{(2)} * -$
		$(n-1)!$		

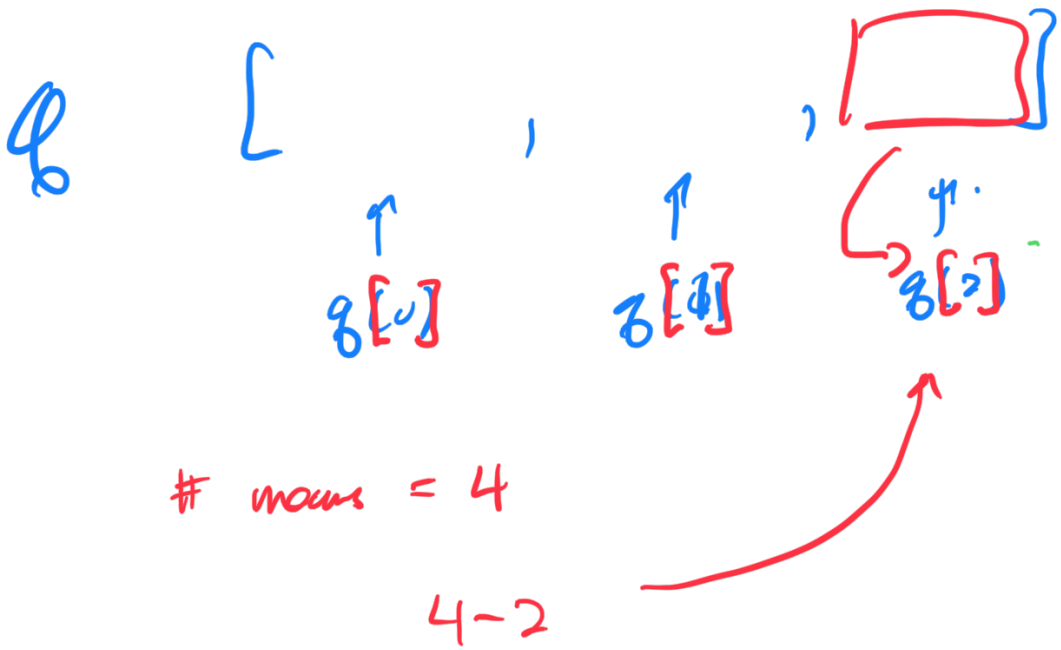
ordered indices.

$\bar{x}_1, \bar{x}_2, \bar{x}_3, \bar{x}_4$

$q^{(2)}$

$q^{(3)}$


g(4)
g(2
g(3)
g(2)


g
[
,
,
g[0]
g[1]
g[2]
nums = 4
4-2