HYPOTHESIS TESTING - 4

χ^2-Test

Hypothesis Testing Framework

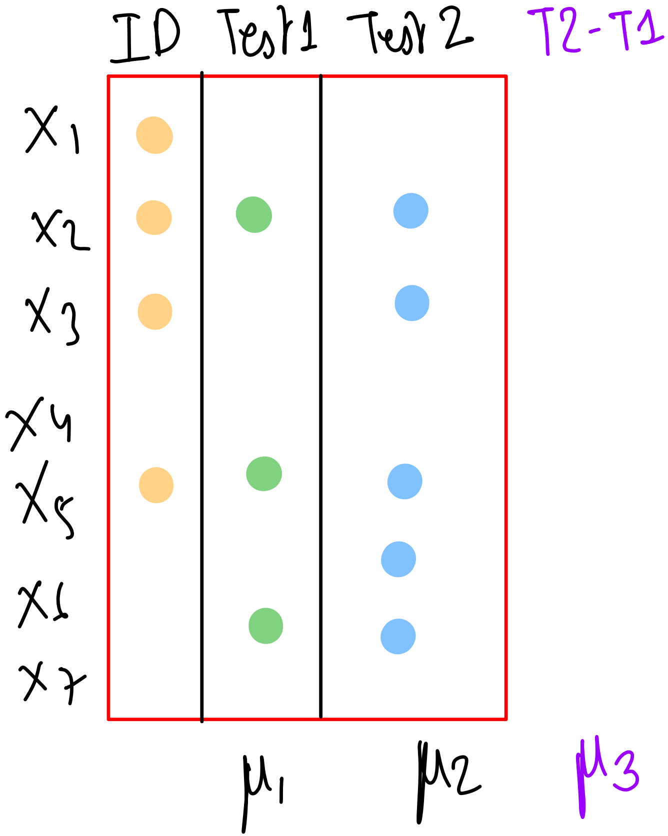
1) Setup the Null and Alternate Hypothesis

2) Choose the right test statistic

3) Left tailed vs Right tailed vs Two-Tailed

4) Compute P-value

5) If P- value is less than alpha , then reject the null hypothesis.



$H_0: \mu_1 = \mu_2$

$H_a: \mu_1 < \mu_2$

ttest_rel

$H_0: \boxed{\mu_2 - \mu_1} = 0$

$H_a: \boxed{\mu_2 - \mu_1} > 0$

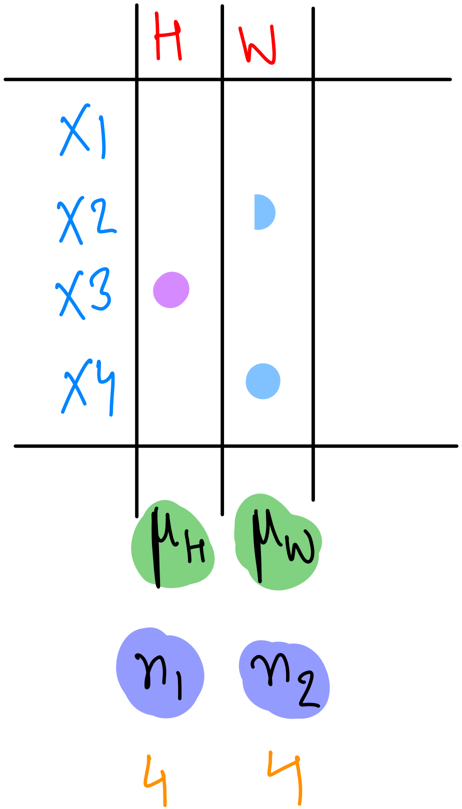
ttest_1samp

DOF → Degree of Freedom

$\underline{\quad}\ \underline{\quad}\ \underline{X} = 36$

If I have 'n' places and I know mean

$$\boxed{DOF = n - 1}$$



$$\boxed{\begin{aligned} DOF &= (n_1 - 1) + (n_2 - 1) \\ &= n_1 + n_2 - 2 \end{aligned}}$$

	A	B	C	D	
X_1					350
X_2					50
X_3					200
	150	140	160	150	600

Rows = m

Columns = n

$$\boxed{DOF = (n-1) \times (m-1)}$$

χ^2 Test

Goodness of Fit | Test of Independance.

① Coin toss

50

H_0. Coin is fair

H_a: Coin is biased

	Heads	Tails
observation	28	22
expected	25	25

$$\chi^2_{stat} = \frac{(28-25)^2}{25} + \frac{(22-25)^2}{25} \qquad \frac{(280-250)^2}{250} + \frac{(220-250)^2}{250}$$

$$\boxed{\chi^2_{Stat} = \sum \frac{(\text{Observed} - \text{Expected})^2}{\text{Expected}}}$$

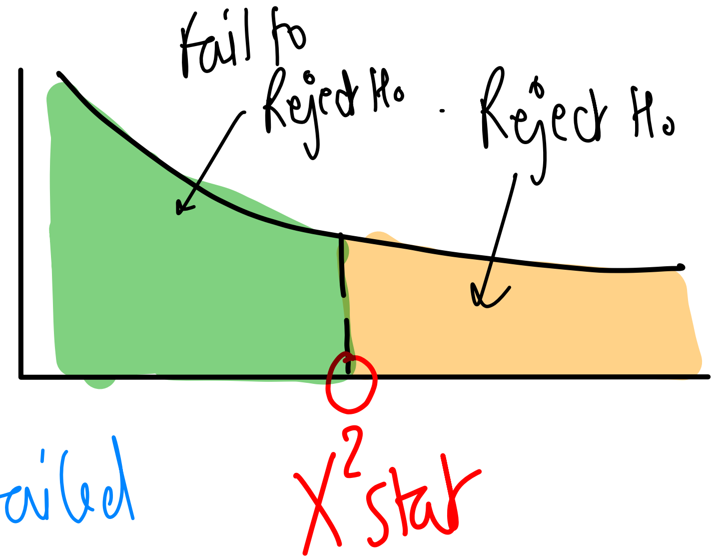
Under H_0 $\Rightarrow$

χ^2 High / low

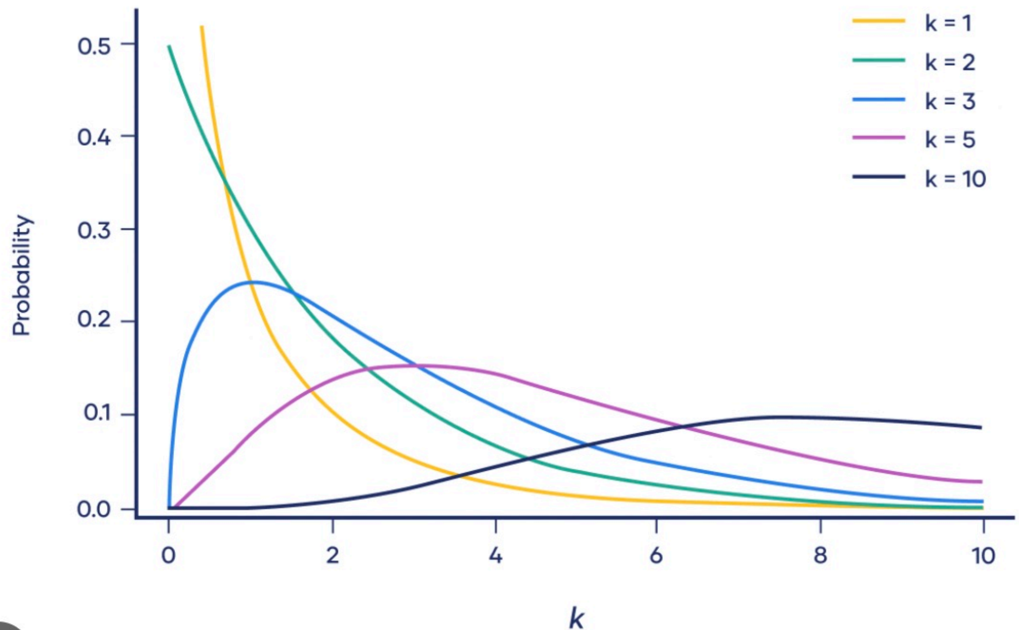
If H_a is true:

$\Rightarrow$ χ^2 High / low

	Heads	Tails
observation	45	5
expected	25	25



χ^2 tests are always Right tailed



10000

8000

100

200

$\boxed{18000}$

20000 - 5000

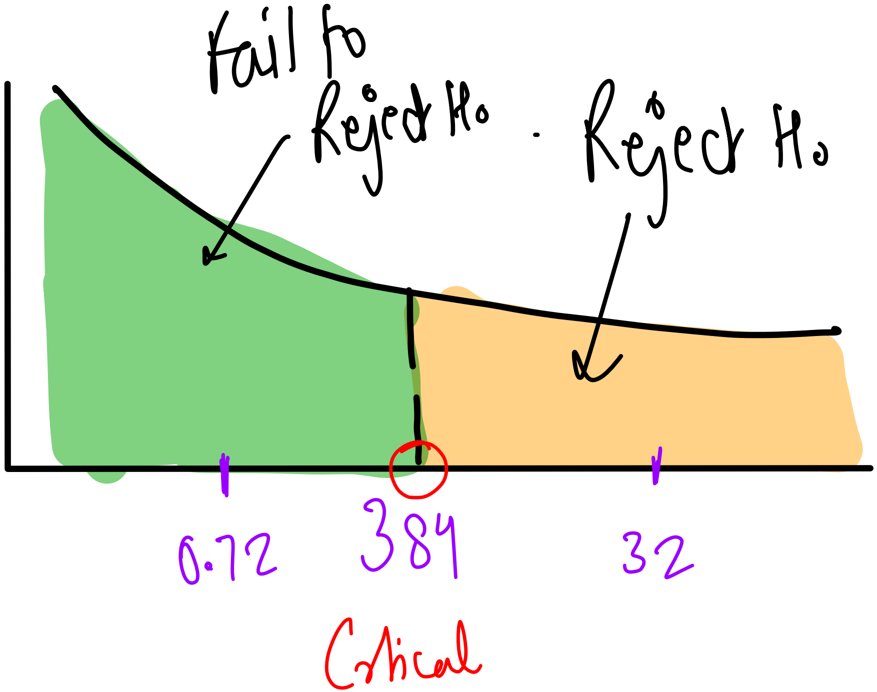
1000

$\boxed{15000}$

5000

bulb manufacturer

	B1	B2	B3	B4	B5	B6
Expected	.10	.20	.30	.10	.15	.15
observation	50	20	10	30	40	50
	0.25	0.1	0.05	0.15	0.2	0.25



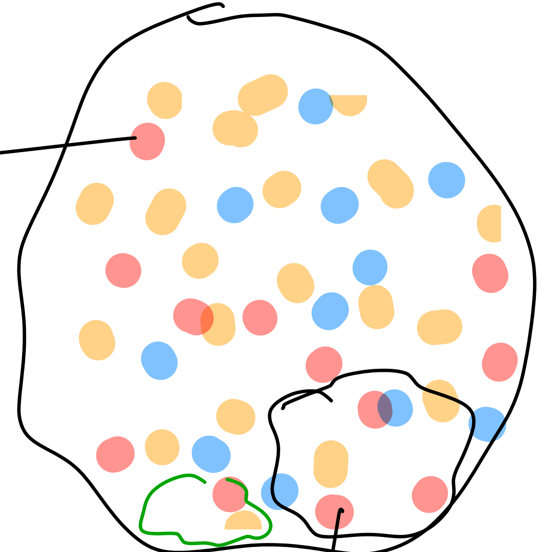
66 Rolls.

Rolling

	1	2	3	4	5	6
Observation	15	12	13	12	13	1
Expected	11	11	11	11	11	11

$$\sqrt{\frac{(x-\mu)^2}{n}}$$

σ_p



$$\sqrt{\frac{(x-\mu)^2}{n-1}}$$

2

3

4

5

σ_s