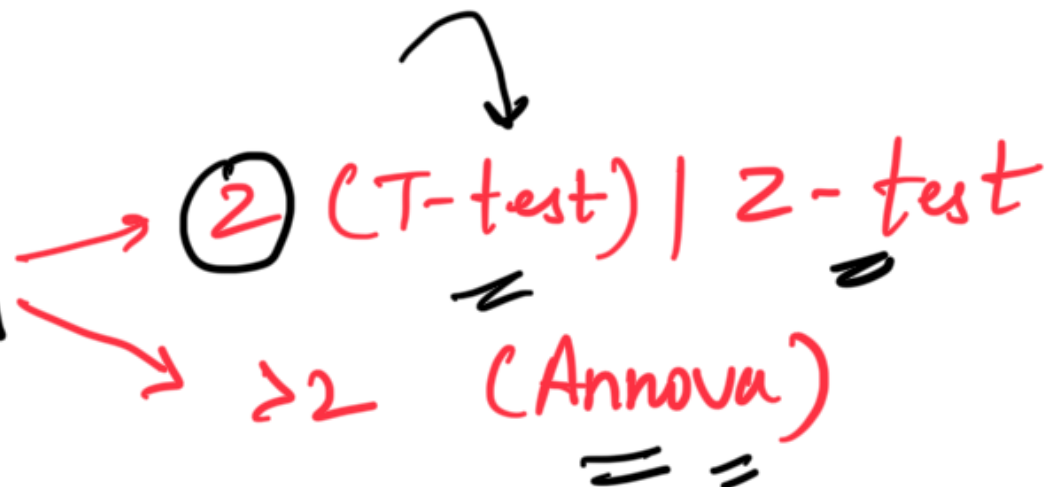


class starts at 9:05 PM

Agenda

- ① Types of Test ✓
- ② Degree of Freedom ✓
- 3) Chisq goodness of fit test
- 4) Chisq Test for independence
- 5) Problem Solving ✓

Types of test



Cat vs Cat → Chi square test

Num vs Num → Correlation

✓ gender
→ { M
P
M
P
Degrees of Freedom

product ✓
{ A
B
C
D

=
2 t test | t-test x

→ "flexibility"

Setup 1: salary

✓ $P_1 - 35$ ✓
✓ $P_2 - n$ ✓
✓ $P_3 \rightarrow 24$ ✓

Avg → 35

$$35 + 36 + x = 35$$

$$n-1$$

$$3-1 = 2$$

$$35 + x + 34 = 35$$

y
x

34

Avg → 35

Height & Weight

n_1	n_2	n_3
\checkmark	\checkmark	Δ
\checkmark H	W	
\rightarrow 73	85 \rightarrow	
\rightarrow 68	73 \leftarrow	
\rightarrow 74	7 \leftarrow	
\rightarrow 74	82 \leftarrow	
\rightarrow 62	70 \leftarrow	
Avg	71	81.2
\downarrow	\downarrow	
$n_1 - 1$	$n_2 - 1$	

$$\text{Dof} = \boxed{(n_1 - 1) + (n_2 - 1)}$$

$$= \boxed{n_1 + n_2 - 2}$$

$$n_1 + n_2 + n_3 - 3$$

$$= (n - 1) + (n - 1)$$

$$= \boxed{2(n - 1)}$$

$$(n_1 - 1) + (n_2 - 1) + (n_3 - 1)$$

$$= n_1 + n_2 + n_3 - 3$$

Century vs Win

Win

What is the min value
that is req to
construct this table?

Century

	P	T	
P	50	✓	314
T	✓	✓	46
	176	184	160

Dof = 1

$$\begin{aligned}
 & (2-1) \times (2-1) \\
 & (2-1) \times (2-1) \\
 & = 1 \times 1 \\
 & = 1
 \end{aligned}$$

176
20
176

→

	A	B	C	D	
X	50	50	50	✓	349
Y	50	50	50	✓	151
Z	✓	✓	✓	✓	150
	150	150	200	150	650

Dof = 6

$$\begin{aligned}
 \text{Dof} &= (2-1) \times (4-1) \\
 &= (3-1) \times (4-1) \\
 &= 2 \times 3 \\
 &= 6
 \end{aligned}$$

Dof = 6

DOF \uparrow variability increases

$$\boxed{x + y + 1 = 443}$$

$$\boxed{x + y = 442}$$

$$\boxed{x + y = 443}$$

(x, y) \downarrow $x + y = 442$

$$\rightarrow x + 32 + 1 = 443$$

$$x = 443 - 33$$

$$x = 410$$

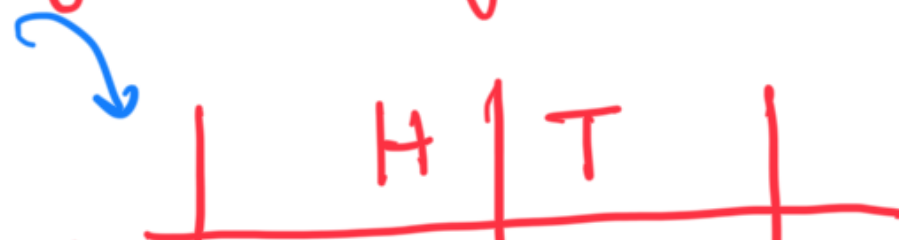
Coin Toss

To check if coin is fair

50 times

1000
=

H



$(x-1) \vee (x-1)$

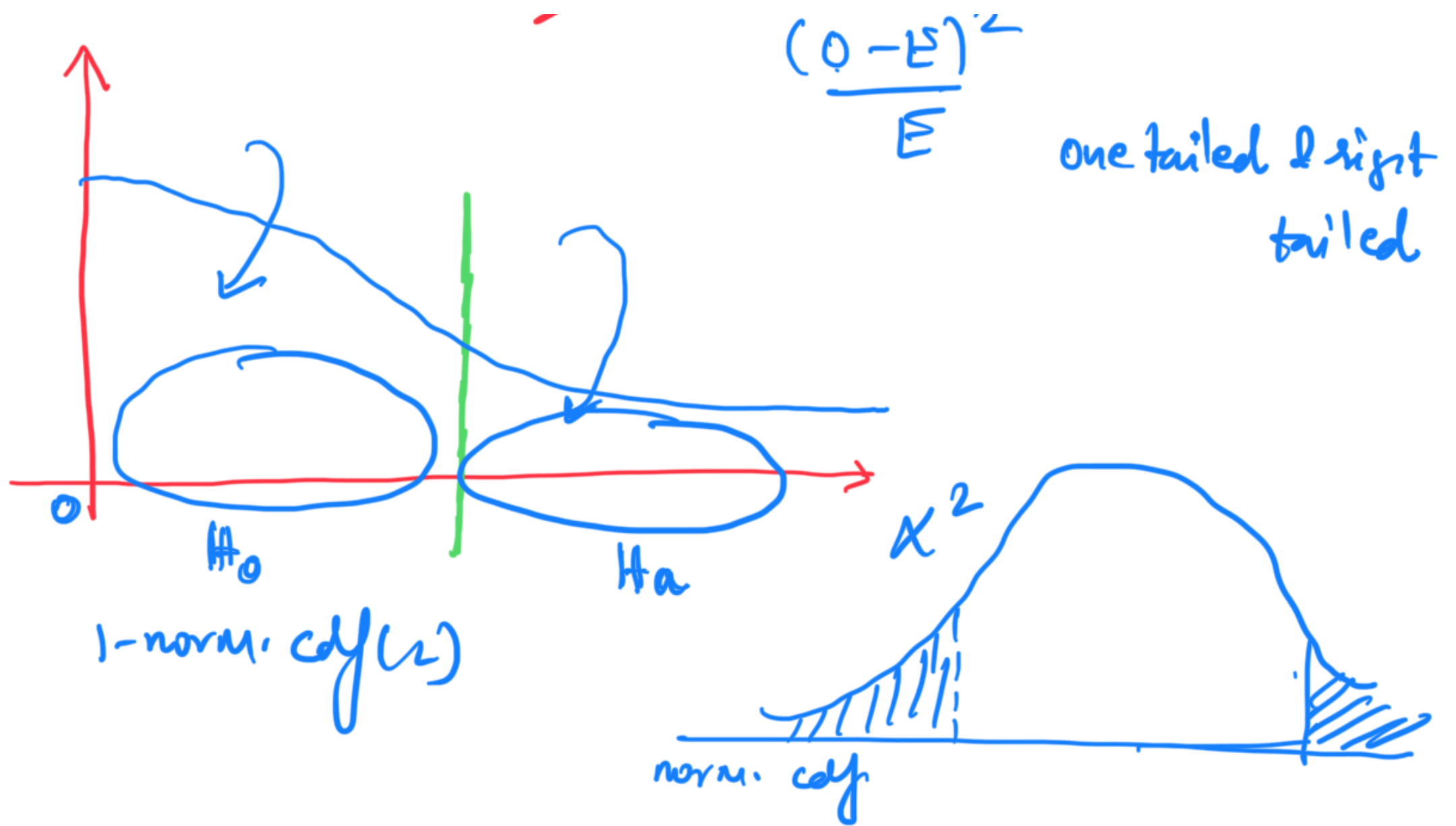
Expected	25	25	50
Actual	28 ✓	22 ✓	50
	(X)	(X)	

Ho coin is fair

$$\begin{aligned}
 &= (25 - 28) + (25 - 22) \\
 &= -3 + 3 \\
 &= (25 - 28)^2 + (25 - 22)^2 \\
 &= (3)^2 + (3)^2 \\
 &= 18
 \end{aligned}$$

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

Ho coin is fair



Test for independence

Survey:- Gender impacts online/offline purchases

Preference vs Gender

(Online & offline)
2 caty

(M/F)
2 categories

H_0 :- gender and preference are independent

H_a :- gender and preference are dependent

Obs values

	M	W	
Offline	527	72	599
Online	206	102	308
	733	174	907

$$907 \times 2\% = 599$$

Expected values

	M	W	
Online	48.4	11.5	599 \downarrow 66%

offline	249	59	108 (24%)
	733	174	907

66% of 733 \rightarrow 484

66% of 174 \rightarrow 115

24% of 733 \rightarrow 249

24% of 174 \rightarrow 59

Assumptions of ChiSq test

- ✓ 1) Cat vs Cat ✓
- ✓ 2) Obs should be independent of one another ✓
- ✓ 3) Exp frequency in each cell should be ≥ 5 ✓

Gender ~~Certain~~ Religion

~~Journal~~
M

~~Journal~~

Journal
M