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	• • •
- are neasured attributes from two	
populations and perdant :	
- is the parameter of interest of	
Certain ville - or pigger mas	
Examples i-	• • •
- Are temperatures on average higher	
than it was los years ago?	
An perdo with high will alwood	· · · ·
- rice people bins ricer bas street	
as age 20 roa likely to acreby	
diabetes at age 60?	
- Down material sonting altert 1	。 () () ()

A way to for mulate the above is to
vieu et a "a test of hypothesis"
-ie <u>Hypothesis</u> test:-
<u>step1</u> make a conjecture/hypothesis about the population.
<u>step2</u> - perform a computation to test the credibility of the conjecture.
we will begin with one example - where we will pose questions that will be resolved at
the end of the chapter.
Example: - Suppose a medical research team wants to design an experiment to determine whether the news developed vaccine for a new disease is effective or not: ? I Field: - clinic trials]
Experiment (first cut strategy):- - choose n - individuals from the population n_1 of then are given the vaccine $n_2 (\equiv n - n_1)$ of them are given the placeb
 - wait a specified amount of fime, to see how many are affected by the disease.

. Sum	avize A	ne findi	ngs on	a 2rc
Table	· · · · · ·			· · · · · · · · · ·
· · · · · · · · · · · · ·	Intected	Not		· · · · · · · · · · ·
VACCIAC	[[X] ^N [[XIL	N ¹	
Placebo	X21	X21	02	· · · · · · · · · · ·
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It the chan discore doe was given a	nce of s not	getting depend or Itres Its	attected whitser is vaccin	the vaccine the vaccine c is mettrative
L.c. It Ualco	Te vace	inc has	no et	tect. evidence.
heneral Que st	ion (<u>Sit</u>	nation :-	, Ir	
- We I	nave tu	so treati	nents ap	pplied to
e 9.	rouge of	experiment	tal civit	3
	of t	no possible	r ontce	anes a constant
<i>i</i> .	rec 50	Xij =	S# of treatm outc	participants given mat i and had onc 5

Note: - In example above there is no explicit
<u>Assome</u> :- n-fixed choose n ₁ - readonly willbout replacement from n.
Exercises :- Suppose we assure chance of setting the discore to b. What is the distantion of XII?
Decision-making: (Ideal) If XII is the among the more likely possibilities (under the indulpendence (vaccine ineffective) then us have no season to subject the ineffectiveness of the vaccine.
On the other hand if XII is the among the impossible " possibilities (under the independence (vaccine ineffective) then we have
reason to reject the hopothesis of the methectiveness of the vaccine

<u>H1</u> Testing in the parametric set up Cintuitive approach)
Example: - · Given a Coin and we are interested in the probability -p- of showing heads, when tossed
• Toss litre coin loo times, $X_1, X_2,, X_{100}$ $X_i \sim Bernoulli (b)$ $Fin0: \sum_{\substack{i=1\\c=1}}^{ion} X_i^c = 67$ - till now we use this to estimate b
Question: - Is $P = 0.5$? versus $P \neq 0.5$ Answer: Compute the $P\left(\sum_{c=1}^{100} X_c = 67\right) =$
under P=0.5 Depending on the answer conclude the hypothesis accurate. or not
· [- find M-L-E. of p given X1, X1,, X1- L- provide a contidence interval for p
Broad procedure to a test :- - X1, X4,, Xn LED samples from X

f(z|p)- X has pm-f / p.d.f PE PERR. Restrict 150 Hypothesis Ital .- - values & Can take, say PEBSGP Device a computation to test the hypothesis find a test-statistic = function of sample X, X, ... X Z-test: - Population is Normal M, 52) M-Unknoon Suppose X1, X1, are ited X~ Normal (4, 5) where or is known but it is unknown. · L E P=R $P_{0} = 2c^{2} - \frac{c}{4}P$ Hypo thesis; $\mu = C$ Intuitive X test-statistic Nain test > check if X=c " X close to c" } Is there a better (depend on 5) Approach with X? X~ Noural(c, 52) if $\mu = c$ <u>Ex:</u> 1.e. hypothesis are true Observed $= \int_{\Omega} \left(\frac{\overline{X} - c}{\sigma} \right) \sim \mathcal{N}[o, 1]$

Ex: <u>Device a computation l Test</u> • Ho: <u>m=c</u> versus HA: <u>m<c</u> · Ho: r=c versus HA: r=c Hint: - Suitads alter the computation $\mathbb{P}(\sqrt{n}(\overline{Y}-c) \ge \sqrt{n}\left(\frac{\overline{X}-c}{\sigma}\right)) \longrightarrow$