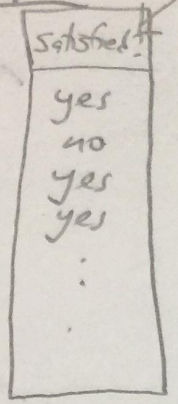
One Proportion Hypothesis Test

Example:



One categorical (two groups) variable

data

$\delta = \hat{p}$

test statistic

$\delta^* = \hat{p}_{obs}$

observed effect: δ^*

model of H_0

$H_0: \pi = \pi_0$

simulated data

Simulate $\pi = \pi_0$ 10,000 times

δ^*

p-value

distribution of δ under H_0

$H_a: \pi > \pi_0$

Could also be

$H_a: \pi \neq \pi_0$

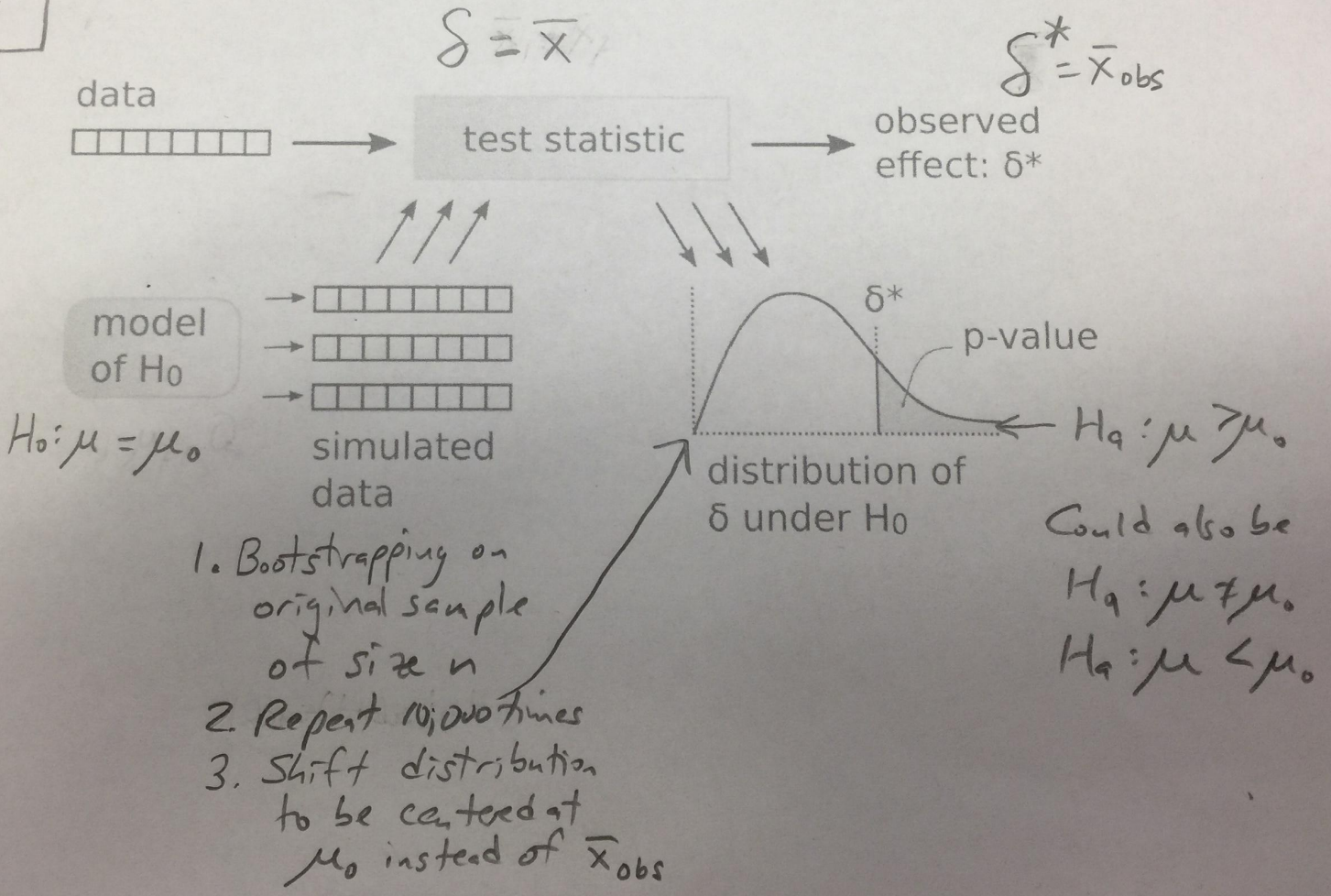
$H_a: \pi < \pi_0$

One Mean Hypothesis Test

Example:

age
32
23
24
26
32
⋮

One numerical variable



Could also be

$H_a: \mu \neq \mu_0$

$H_a: \mu < \mu_0$

Two Proportions Hypothesis Test

Example:

College_grad	response
yes	opinion
yes	no opinion
no	opinion
no	no opinion
⋮	⋮

← Two categorical variables (Two groups each)

Success is "no opinion"

$\delta = \hat{p}_1 - \hat{p}_2$

$\delta^* = \hat{p}_{1,obs} - \hat{p}_{2,obs}$

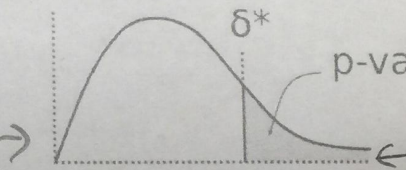
data → test statistic → observed effect: δ^*

model of H_0

$H_0: \pi_1 - \pi_2 = 0$

simulated data

1. Shuffle one of the variables across the other
2. Calculate proportion of success for each group of explanatory variable.
3. Repeat 10,000 times



distribution of δ under H_0

$H_a: \pi_1 - \pi_2 > 0$

Could also be

$H_a: \pi_1 - \pi_2 \neq 0$

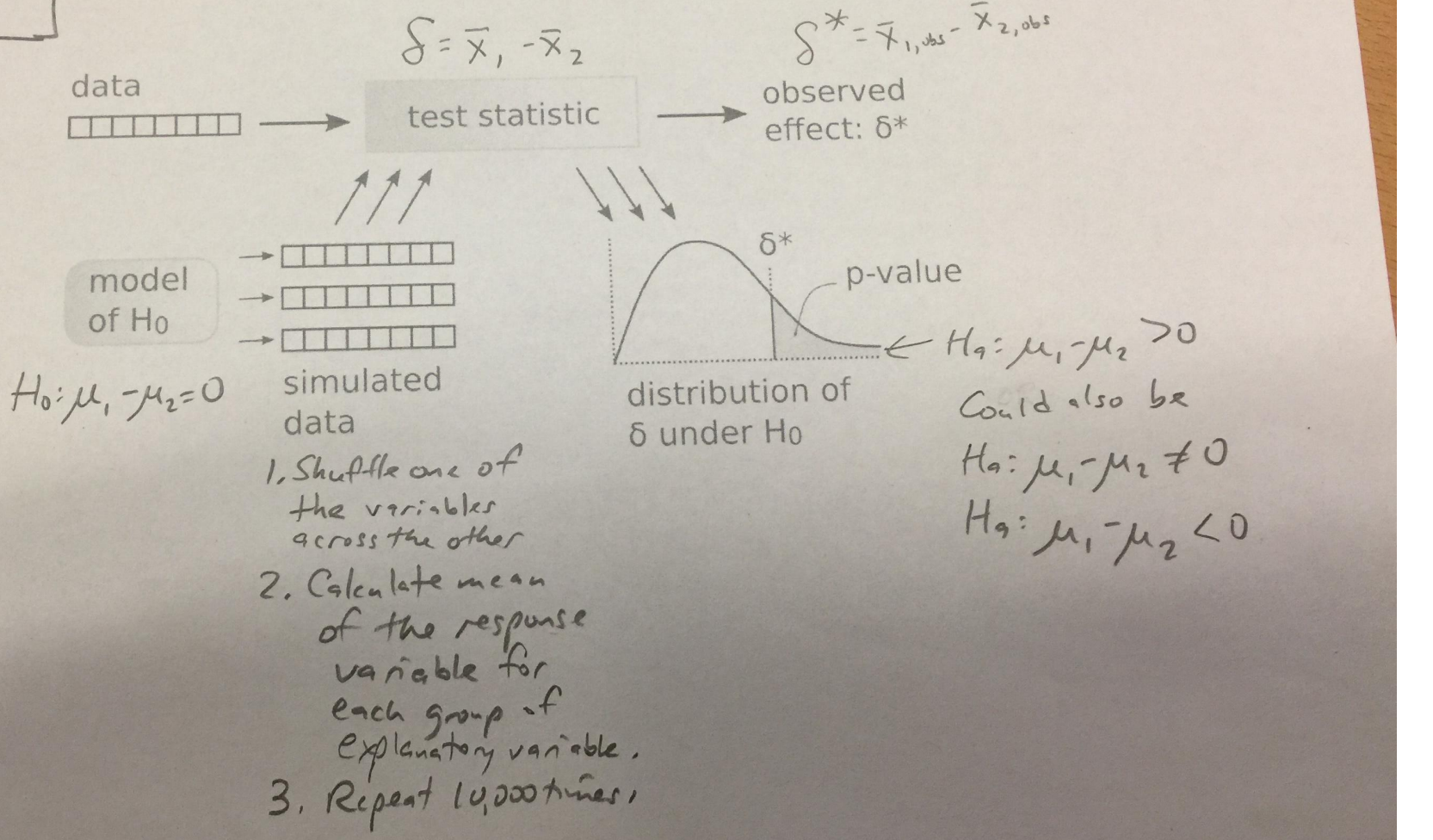
$H_a: \pi_1 - \pi_2 < 0$

Two Means (Independent Samples) Hypothesis Test

Example:

metro_area	income
Sacramento	40,000
Cleveland	30,000
Cleveland	37,274
Sacramento	73,295
⋮	⋮

One Categorical Predictor / Explanatory
One Numerical Response



$H_0: \mu_1 - \mu_2 = 0$

$H_a: \mu_1 - \mu_2 > 0$

Could also be

$H_a: \mu_1 - \mu_2 \neq 0$

$H_a: \mu_1 - \mu_2 < 0$

1. Shuffle one of the variables across the other
2. Calculate mean of the response variable for each group of explanatory variable.
3. Repeat 10,000 times.

Two Means (Paired Sample) Hypothesis Test

Example:

diff
-3
-2
1
-1
6
⋮

← One Numerical Response Variable (Calculated as the difference across each pair)