

## Hypothesis Testing

Wednesday, 17 November 2021 7:09 PM

99.4% ?

Attempt-1

5-6  
Sample

Attempt-2

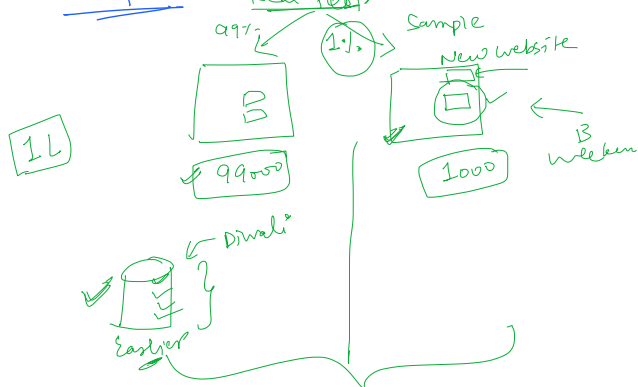
(Conduct Survey)

50k-100k

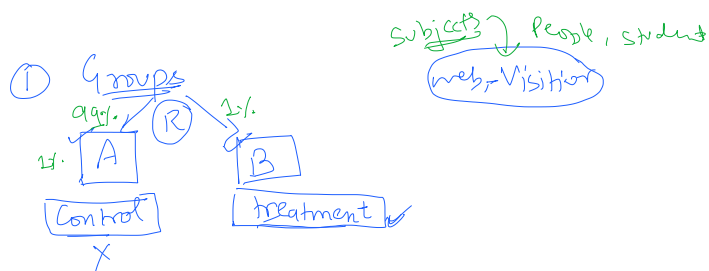
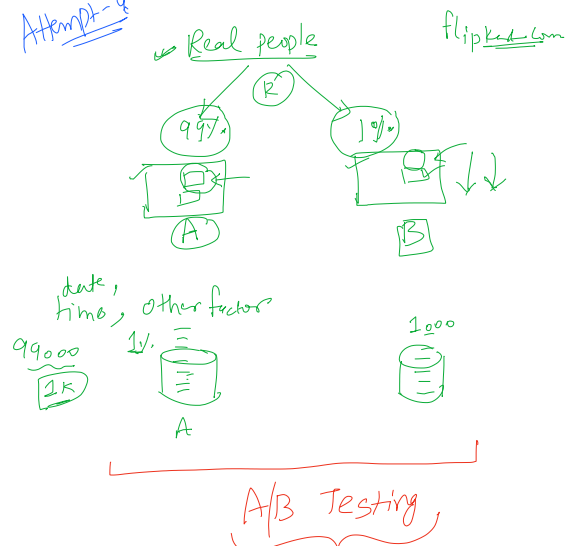
[Selection bias]

"self selection"  
R50

Attempt-3 → Real People



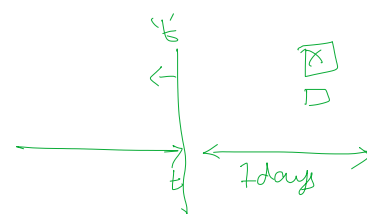
Attempt-4

Hypothesis: treatment is Better than control

Test: Metric / test-statistic

- # of clicks
- revenue
- amt of purchase
- $\frac{\# \text{ amt}}{\# \text{ clicks}}$
- Conversion Rate

Buy Now



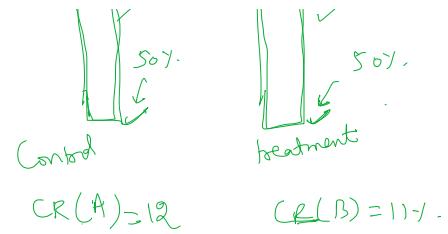
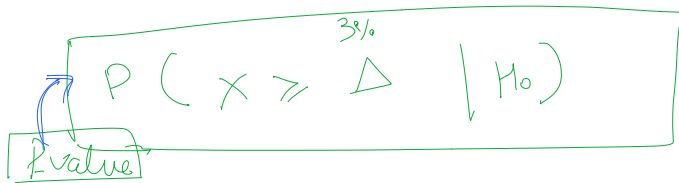
## # Hypothesis Testing

Assuming  $H_0 =$  There is no difference in treatment & control  
 [Null Hypothesis]  $X = \underbrace{CR(B)}_{\text{treatment}} - \underbrace{CR(A)}_{\text{control}}$

$H_1 =$  treatment is better than control.  
 Alternate Hypothesis

$$CR(B) > CR(A)$$

$$CR(B) - CR(A) > 0$$

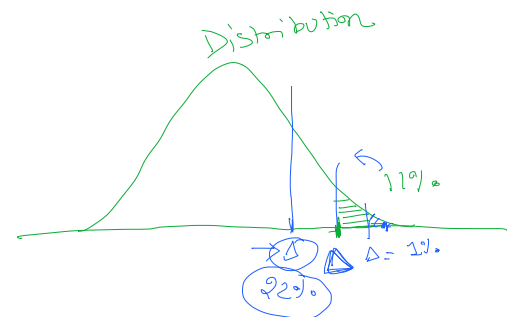
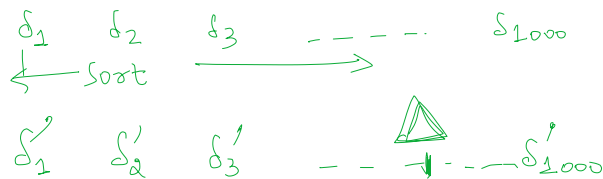
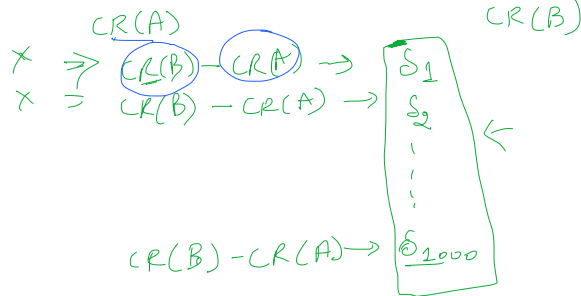
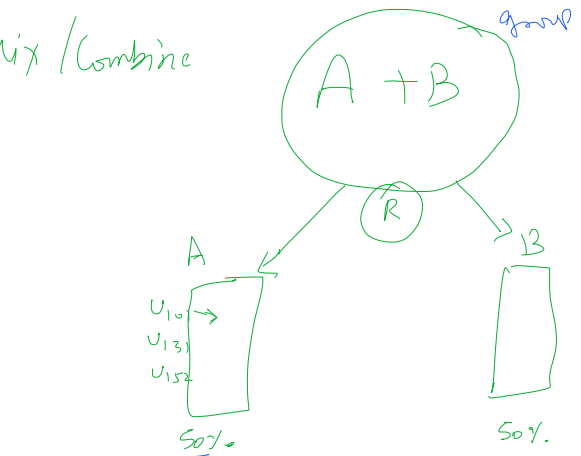


obs diff = -0.15%  $\Rightarrow$   $\Delta$  3%  
 observed difference

## Permutation test

Resampling  $\rightarrow$  Bootstrap  
 $\rightarrow$  Permutation

Mix / Combine



2% of values more than  $\Delta$ .

2%

$$P(\overset{X}{\boxed{CR(B) - CR(A)}} \geq \Delta | H_0) \Rightarrow \alpha = 2\% = 0.02$$

P-value

$$P(X \geq \text{obs} | H_0) > \boxed{5\%}$$

P-value

fail to reject  $H_0$

$$\boxed{P(x \geq \text{obs} | H_0)} \stackrel{\text{p-value}}{<} \textcircled{5\%} \approx \underline{1.5\%}$$

reject  $H_0$   
 Accept  $H_1$  ?

Significance threshold  $\alpha$