DA25 - Assessment for the Math and Statistics module

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1.Definition the hypothesis

The business problem

The problem

Making a decision about a change on the product webpage (horizontal vs vertical rail) in order to increase the user engagement.

Drawbacks

It might not get the desired outcome and even end up in a negative impact for the company.

Importance

It is important because it might result in an increase of sales and/or website traffic.

Hypothesis

- The **H0** or hypothesis is that Variant B (“vertical rail”) will perform better than Variant A on the bussiness metrics.
- The **null hypothesis** is that both versions will get equal or very similar results meaning Variant B is not better than A.
- The **H1** or alternative hypothesis is that Variant A performs better on the metrics than Variant B.

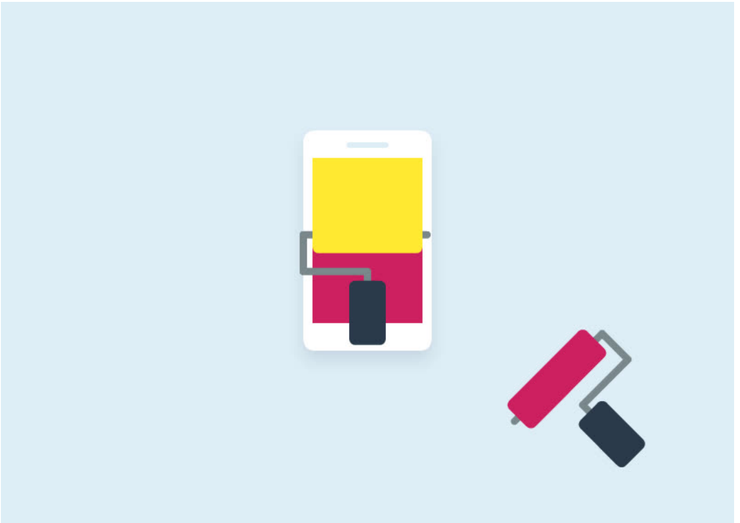
2.Evaluation of the hypothesis

Why A/B test?

- A/B testing allow us to compare two or more versions of something by presenting them to similar groups of users in a controlled environment. This helps isolate the effect of changes being tested.

- It involves randomly assigning participants to different groups which helps minimize bias and ensure that the groups are comparable at the outset of the experiment.

- It shows how changes affect user behavior and performance in a natural environment.



Another method that could have been used

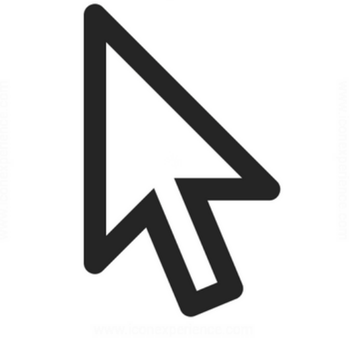
The other method would be a heatmap on the webpage.

- Advantages:
  - Offers visual insights into user behavior and interaction patterns, helping to identify areas of interest or friction points.
  - Provides a qualitative understanding of user engagement that complements quantitative analytics data.
- Disadvantages:
  - Doesn't provide direct comparisons between different variations.
  - It might require additional interpretation to draw insights.

Metrics

The metrics are **Add to cart**, **Clicks on Media** and **GMV**.

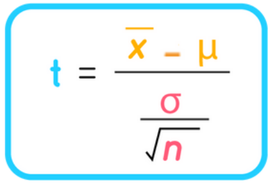
- Since the change is related to the product webpage and the priority is to increase sales **Add to cart is the primary metric.**
- The secondary metric is Clicks on Media which related to user engagement.
- The third metric is GMV since it shows the diffenrence in sales between the Variants.



The metric I wish I had is “Number of orders” to observe the correlation between the other metrics and analyse if all of them correlate.

The t-test

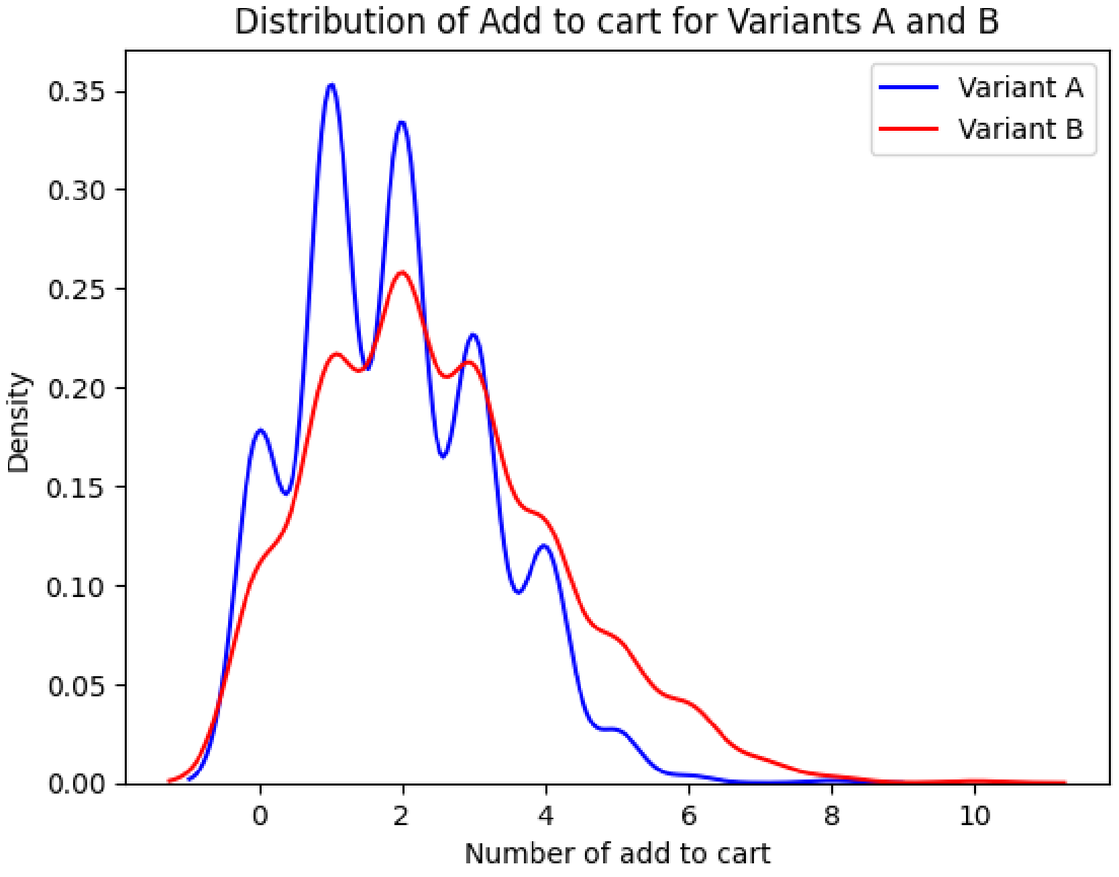
First to compare the Metrics with their variant I observed the **means** and then to check if there's a **statistical significance** I observe the **p-values** of the metrics that I got after running the **t-test.**



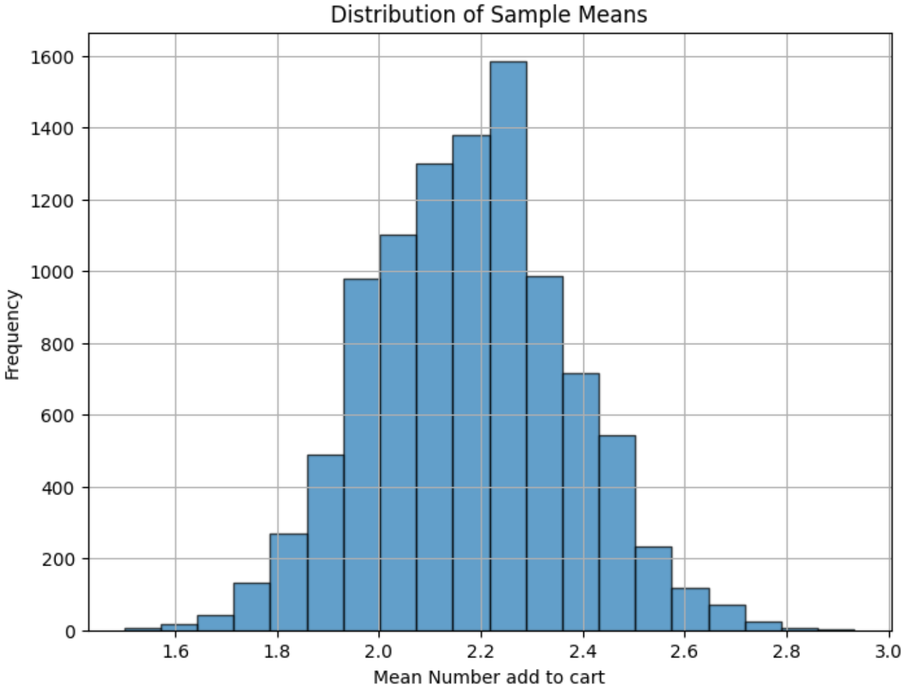
where,
'x' bar is the mean of the sample,
μ is the assumed mean,
σ is the standard deviation
and n is the number of observations

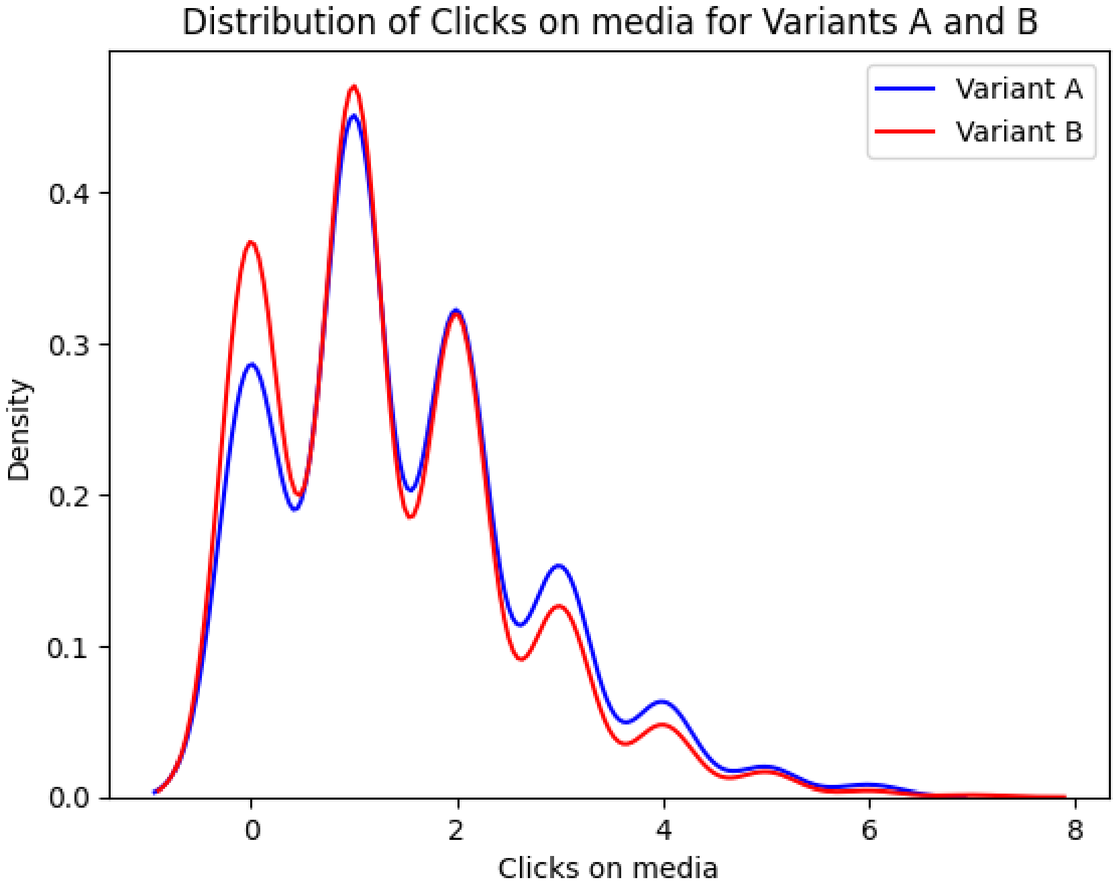
Sample size

Variant	
A	1000
B	1000

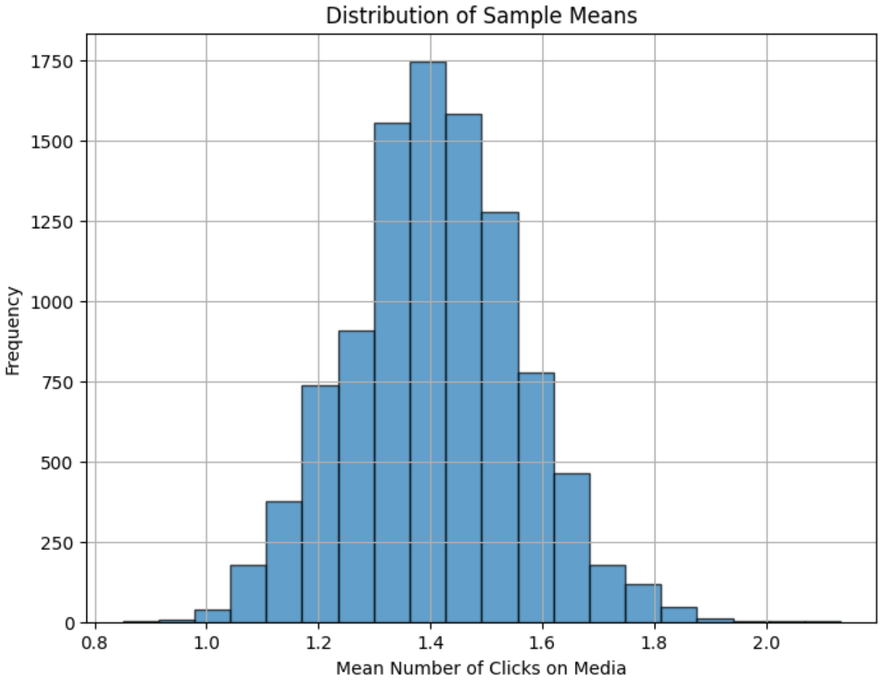

Distribution of Add to cart for Variants A and B
Variant A
Variant B
Density
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0
2
4
6
8
10
Number of add to cart

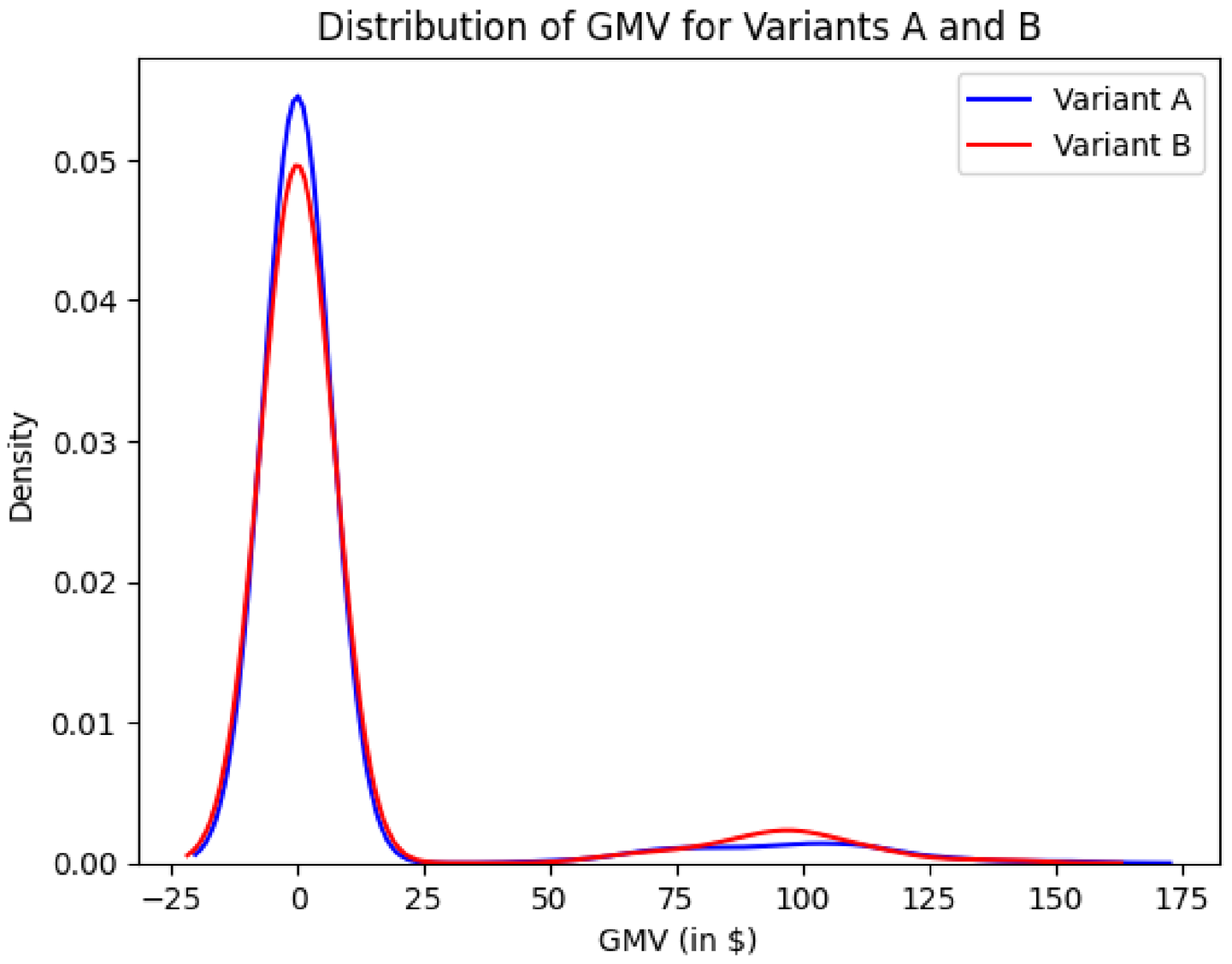
CLT


Distribution of Sample Means
Frequency
1600
1400
1200
1000
800
600
400
200
0
1.6
1.8
2.0
2.2
2.4
2.6
2.8
3.0
Mean Number add to cart


Distribution of Clicks on media for Variants A and B
Variant A
Variant B
Density
0.0
0.1
0.2
0.3
0.4
0
2
4
6
8
Clicks on media

CLT

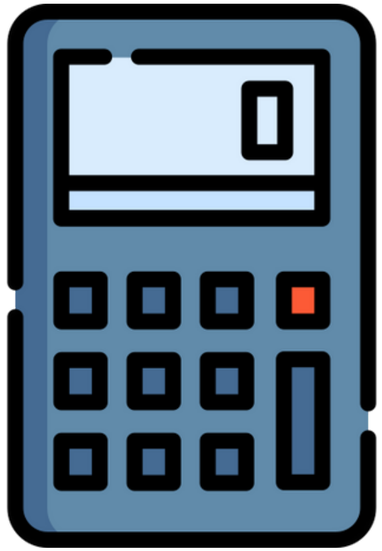

Distribution of Sample Means
Frequency
0
250
500
750
1000
1250
1500
1750
0.8
1.0
1.2
1.4
1.6
1.8
2.0
Mean Number of Clicks on Media


Distribution of GMV for Variants A and B
Variant A
Variant B
Density
0.05
0.04
0.03
0.02
0.01
0.00
−25
0
25
50
75
100
125
150
175
GMV (in $)

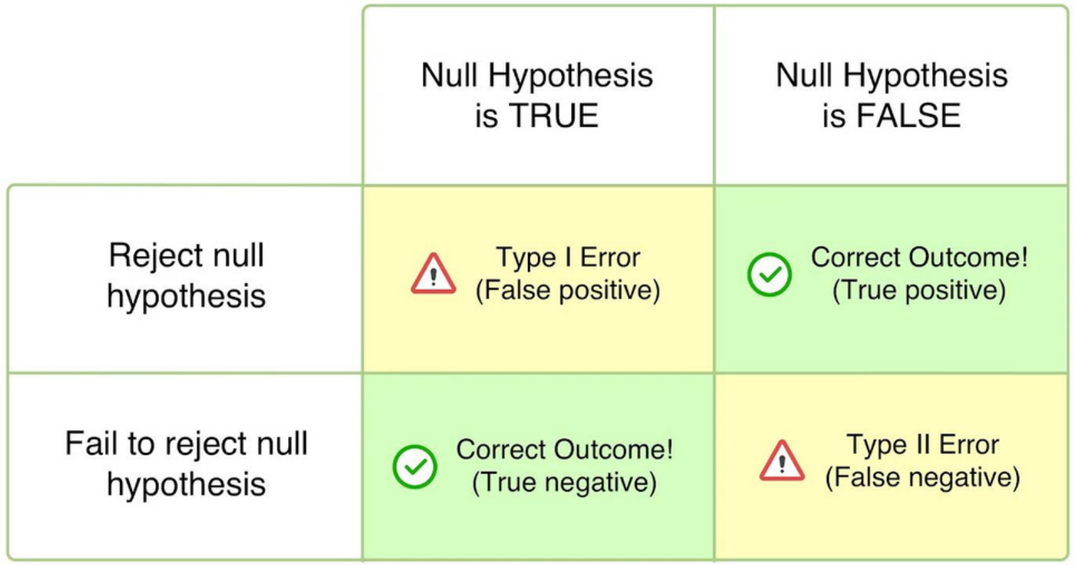
Result of the test

- The mean **Add to cart** is 1.88 in A and 2.47 in B
- The mean **Clicks on media** is 1.50 in A and 1.32 in B
- The mean **GMV** is 7.69 in A and 9.29 in B

- The p-value of Add to cart is **3.517079e-18.**
- The p-value of Clicks on Media is **0.001542.**
- The p-value of GMV is **0.199307.**

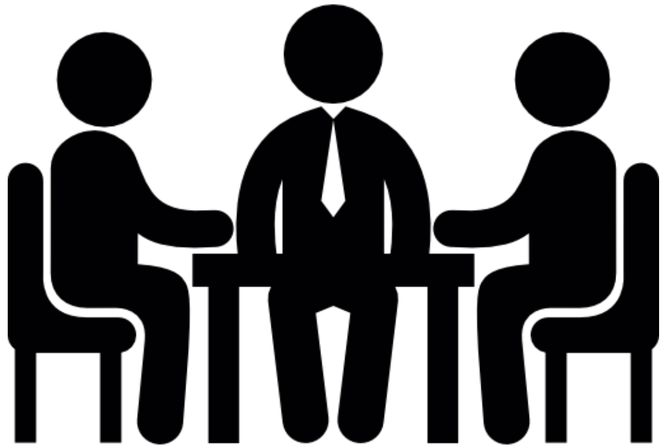


- **Reject** the null hypothesis
- **Reject** H0
- and **fail to reject** the H1



Recommendation

My recommendation after observing the results of the t-test is to **not make any change in the website and stick with Variant A.**



Thank you.