**Background**

The mission of Company ABC is to enhance the online grocery shopping experience through the integration of automation and Artificial Intelligence (AI). We are currently experimenting with an innovative concept known as ‘**express store**’: fast delivery using a subset of products from the product catalog compared to traditional grocery stores. This initiative requires no additional construction or supply chain development, so we can ship and iterate very quickly.

We ran a small **experiment** with one of our grocery partners with three variants: 1. **Variant 0**: A **control group**, which had the normal online shopping experience, without the ‘express store’ enabled.

2. **Variant 1**: users were offered an ‘**express store**’ option on the store selection page. The ‘express store’ has a narrower selection than the full grocery store, but we guarantee faster delivery times. This faster ETA is integrated into the entire customer journey, from the store selection page through the checkout page.

3. **Variant 2**: which was also offered the ‘**express store**’ and were additionally allowed to check out with a **$10 basket size** as opposed to our standard minimum basket size of $35.

**Column Definitions**

● **experiment\_group** & **grp\_code**: which experiment group they were assigned to. ● **assignment\_date**: the date on which customers were assigned to the experiment.

● **address\_type**: business or residential.

● **express**: whether customers are a member of company ABC’s express program. Note this membership program is different from the ‘express store’ feature we are experimenting with. Once customers enrolled in the express program, they are eligible for benefits such as 5% cash back, low service fee.

● **loyalty**: whether customers are in the retail partner's loyalty program.

● **order\_placed**: how many orders customers placed since assignment. ● **avg\_order\_value**: average order size since assignment.

● **total\_spend**: total spend by customers since assignment.

**Questions**

1. What can we learn from the experiment results, and what do you recommend? You can assume the primary intention of this change was to increase **total spend**.

| Group | Average spending | P-value of comparing to control |
| --- | --- | --- |
| Control | 174.16 |  |
| Variant 1 | 177.52 | 0.072 |
| Variant 2 | 190.26 | 0.000 |

**Answer 1**.

What we learned:

* both variants 1 and 2’s average spending is higher than the control group,
* but variant 1’s P-value > 0.05, meaning the difference from variant 2 compared to control is NOT SIGNIFICANT.
* Variant 2‘s P-value < 0.05, meaning its total spending is SIGNIFICANTLY higher than the control group.

Recommend:

* Variant 2 is recommended to increase the total spending.

2. How do we assess the **reliability** of these findings?

**Answer 2**. We access the liability of the finding by the P-value of the T-testing.

3. Many costs are fixed regardless of order size (e.g. the shopper's driving distances and times), so, in general, the more deliveries, the more cost. Our revenue is proportional to customer spend. For simplicity, please assume we can either launch a variant as-is to all customers or stick with the control (no launching to a customer subset for this question):

○ How should we think about the negative impact on our unit economics from launching the variant to all customers as is?

○ In particular, is there a "cutoff point" for ROI where we would no longer want to launch this? What if our revenue was 5%, 10% or 20% of

customer spend?

**Answer 3**.

The negative impact of launching the variant is the high potential cost due to the number of orders is ignored.

At some point when the cost of orders exceeds the total spending, the revenue will be negative. Then we don’t want to launch this variate.

4. What are your final thoughts on this? Here are some ideas for topics:

○ What other analysis of this data would you plan to do with more time?

○ What else do you wish you knew?

○ What other considerations should influence our launch decision?

**Answer 4**.

I want to calculate the relation between the spending and the number of orders.

I wish to know the unit cost for each single order.

The launch decision should also consider the cost of the product itself not only the spending, delivery cost.