**The neighboring cities of Gotham and Metropolis have complementary circadian rhythms: on weekdays, Ultimate Gotham is most active at night, and Ultimate Metropolis is most active during the day. On weekends, there is reasonable activity in both cities. However, a toll bridge, with a two way toll, between the two cities causes driver partners to tend to be exclusive to each city. The Ultimate managers of city operations for the two cities have proposed an experiment to encourage driver partners to be available in both cities, by reimbursing all toll costs.**

1. **What would you choose as the key measure of success of this experiment in encouraging driver partners to serve both cities, and why would you choose this metric?**

The first metrics I would choose is the change of the number of drivers that cross the bridge, especially from a higher active city to a less active one. For example, the number of drivers crosses the bridge from Gothem to Metropolis at night during a weekday. This can give us information on whether or not a driver is willing to go to the less active area if Ultimate offers to reimburse the toll costs.

The second metrics I would consider is the waiting time for a customer to find the driver. The reason is that if the number of available drivers increases, it should take the customers less time to find one in the area.

1. **Describe a practical experiment you would design to compare the effectiveness of the proposed change in relation to the key measure of success. Please provide details on:**

**a. how you will implement the experiment**

**b. what statistical test(s) you will conduct to verify the significance of the observation**

**c. how you would interpret the results and provide recommendations to the city operations team along with any caveats.**

1. We can start offering toll fee reimbursement during weekdays and recording the data discussed in the question above. In order to minimize the noise in the experiment, I would suggest recording the weather as well since the need for driver partners may also depend on the weather. For example, the need may increase during a rainy day.
2. We can use hypothesis test. Assuming there is no difference in the two metrics we defined after offering the toll fee reimbursement. Then with the chosen confidence level and statistical power, we can perform the null hypothesis test. If the difference we observe is outside the statistical variation then we can say that the observation is significant.
3. If we do see the difference with and without the toll fee reimbursement for the metrics we designed. This can be interpreted that the drives are more willing to cross the bridge to the less active city. At the same time, since the wait time decreases, more customers may be willing to use Ultimate in the off peak hours. However, whether Ultimate should launch this incentive or not also depends on other factors. For example, providing toll fee reimbursement inevitably increases the operational cost at the same time. We should take this into account to see if Ultimate’s net revenue can be increased.