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 goal is to maximize revenue by having more drivers available in each city during its busiest hours. More drivers in Metropolis during daytime to accommodate the high demand. More drivers in Gotham to accommodate the high demand. With Metropolis and Gotham being so close together geographically, yet so far apart due to the bridge, waiving the fee should theoretically eliminate the one thing holding them back from working across cities.

At a high-level, one could look at a revenue increase but we want to ensure it's a result of drivers working across cities. One way to do this would be to look at the addresses of drivers and compare it to the location of their drives. See if Metropolis drivers are doing drives in Gotham and vice versa. Another way would be to check the number of drivers happening in each city during its peak hours. Check if more Gotham riders are being accommodated during the day and more Gotham riders being accommodated during the night.

2. 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

Split the drivers in Metropolis and Gotham into two groups at random. Give one group the waived toll fee and keep the other group the same. Observe the difference in behavior between the two groups. See if Metropolis drivers are working in Gotham and if Gotham drivers are working in Metropolis. Though only half the drivers will have the discount, it may be enough to see a noticeable increase in rides so check to see if Metropolis daytime rides increase and Gotham nighttime rides increase.

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

A two-sample t-test would work comparing the number of cross-city rides the waived-fee group does vs the control group. Could also do the same t-test comparing the daily rides in each city before vs during the experiment, though you'd have to make sure the experiment runs for a full week and not during a time where there would be confounding variables like holidays or something.

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

I would look for statistical significance in the tests suggested above. I would take the difference of means for the number of rides and apply the mean revenue per ride to estimate the increase in revenue as a result of the waived fee change. The cost of waiving the toll fee would have to be subtracted from the revenue increase as well.