Data Scientist, Economist
Take Home Exercise

- You have one week to submit your work.
- Please clearly explain how you would tackle the problems in detail. Partial answers are totally acceptable.
- If anything is unclear, please reach out to your contact on the recruiting team.
- Should you pass this stage, you will be asked follow up questions on your take home problem during some of the on-site interviews.
- For the empirical part use any tool or language you would prefer.
- Please note that we are not providing real data for the purposes of this exercise. The below exercise does not reflect our riders' access to work or pay.
- It is a condition of your participating in the interview process that you do not share the data sets or your submission with anyone outside of Deliveroo.

Rider Rewards

Theoretical Part

We would like to develop a loyalty scheme for our riders. The general idea is to reward riding for Deliveroo beyond the fees riders earn for delivering individual orders.

a. What incentive schemes seem promising to you? Would you consider monetary or non-monetary awards? Why?
b. An incentive scheme could either be based on hours logged in to the rider app or orders delivered. What do you think are the advantages of an hours based one? What about one based on orders delivered?
c. Imagine that your team has worked on developing an incentive scheme and you are ready to test it. Often, new product ideas at Deliveroo are tested through experiments. How would you design an experiment for the incentive scheme you developed?
    i. What metrics would you test to determine whether the scheme is a success?
    ii. What experimental design would you use to test the scheme?
    iii. How would you determine the number of riders and the duration of the experiment?
    iv. How would you analyse the experiment?

Empirical Part

The attached data set contains (simulated) information on different riders (rider_id), the areas in which they worked (zone_id), the hour-date (start_time), the fraction of the hour that they worked (hours_worked), the number of orders they delivered during that hour (orders_delivered), and the earnings they received (earnings).

a. Using the data, characterize the distribution of rider activity in terms of hours worked, orders delivered, and earnings per hour. What patterns do you see? Do they seem sensible?
b. If you were to choose an incentive scheme based on hours worked, using the data at hand, how would you set the different tiers (i.e., where would you choose the cutoffs)?
c. If you were to choose an incentive scheme based on orders delivered, using the data at hand, how would you set the different tiers (i.e., where would you choose the cutoffs)?
d. This question tries to develop a back-of-the-envelope estimate of the supply impact of the incentive scheme you developed:
    i. Could you use the data set provided to estimate the supply elasticity of riders? Why or why not?
    ii. Ignoring the concerns you may have had in your answer to the above question, how would you estimate the labor elasticity? What is the value you estimate?
    iii. Taking your estimated supply elasticity, what is the estimated total supply impact of your incentive scheme?