

# Problem Set for the Winter Break

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## Questions

In the labs, we used a generated data set to implement a number of different estimation strategies such as

- Randomization
  - Regression discontinuity design
  - Difference-in-differences
  - Matching
  - Instrumental variables
1. Provide an overview of the key variables of the data set, i.e., those that change across methods.
  2. For each method, state the variables used and compared. Alternatively, the variation used to identify the treatment effect.
  3. One of the many buzzwords in the tech industry is **A/B testing**, see [https://en.wikipedia.org/wiki/A/B\\_testing](https://en.wikipedia.org/wiki/A/B_testing). How does it relate to topics we studied in this course? Discuss the underlying assumptions for its validity.
  4. We mentioned briefly the concept of **counterfactual** at the beginning of the course. What is a counterfactual? Briefly discuss how it relates to the issue of common trends in Difference-in-differences. Discuss how the concept of counterfactual could differ from the above when considering an economic model of supply and demand.