POU33011: Assignment 3

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Instructions

- Due date: **Wednesday 17:00**, week 10. Please submit your document via Blackboard.
- Submit a single document including the R code used and your answers.
- In line with College and the School's marking norms, the maximum mark on this assignment is 75.
- Presentation matters (worth 5% of the mark).

Questions

Research Design (50%)

The effectiveness of face masks in reducing the spread of the Covid-19 has become a subject of intense political interest. Suggest a research design that would allow you to determine the efficacy of face mask mandates (i.e., rules such that individuals must wear face masks in public spaces) on the spread of the virus. (max 350 words)

NB1: Remember that you are trying to make a causal claim that masks prevent (or do not prevent) the spread of the virus. Be sure to address challenges that may affect your ability to conclude one way or another.

NB2: your study is not about the effectiveness of masks in a laboratory, but based on observational data from the "real world", such as (for example but not limited to) the number of masks used in a given state, or the enforcement of a mask mandate and its effectiveness in limiting the spread of the virus. You may not use an experiment but must use existing data.

NB3: to avoid any doubt, you do not need to collect any data or do any actual analysis. You only need to suggest a research approach (a design) that, if implemented, would allow you answer the question.

Statistics (45%)

1. Suppose that students' grades are normally distributed with mean 60 and standard deviation 10. What is the probability that a randomly selected student has a grade (15%):
    - greater than 40
    - greater than 70
2. You take a sample of 36 students' grades (assume they are independent). The mean $\overline{x}$ of that sample is 55, with standard deviation 16. Calculate the **mean** and the **standard deviation** of the sampling distribution. (15%)
3. You collect a sample of 100 students' political orientation (from 0-10, where 0 represents the left and 10 the right). Suppose these observations are independent. The mean orientation is 4.6, with standard deviation 3. How would you formulate and test the hypothesis that students' political orientation is different from the general public's mean orientation of 5? (15%) NB: this question requires material covered in week 9.