



SJMMMA 2022 B 题

疫情传播与阻击

2022年,新冠疫情在全球很多城市复燃。中国也有多处城市爆发疫情,并采取多种方法齐心协力阻击疫情传播。尽快实现疫情拐点对社会复工复产经济复苏加速非常关键,然而在疫苗接种程度、居民生活保障、检测能力、医疗救助、人群转运等各种因素下,阻击疫情传播的策略对疫情传播的影响均存在不确定性,我们希望能结合公开信息和调研,对这些因素充分挖掘与分析,设计一套合理预测疫情传播的数学模型,衡量这些阻击策略对模型的影响。

任务1:假设疫情传播只跟阳性病人数,人口总数和疫苗接种率相关,尝试建立某城市/地区建立疫情传播的数学模型。

任务2:根据公开信息,考虑更加多元因素的影响,建立某城市/地区建立疫情传播的数学模型;在此基础上,挖掘一些重要参数,并合理分析预测和实际数据的偏离。从你的模型出发,定性或定量地讨论不同城市/地区之间疫情传播的差异。

任务3:充分挖掘可能阻断疫情传播的方法和策略,尝试定性或者定量的分析这些因素的效用。结合公开信息和调研,量化这些阻击策略对你提出数学模型的影响,以及对恢复正常经济生活产生的积极影响。

提交 你的团队所提交的报告应包含 1 页“总结摘要”,其正文不可超过 20 页(总页数限于 21 页)。附录和参考文献应置于正文之后,不计入 21 页之限。



SJMMA2022 Problem B

Spread and containment of the pandemic

The COVID-19 pandemic has reignited over the globe in 2022, including numerous cities in China. Multiple measures have been taken to contain the pandemic and expediting the inflection point of the pandemic is crucial to resuming social production and economic growth. However, constrained by vaccination rates, residential sustenance, testing capacities, medical assistance, and population migration, containment strategies and their impact on the pandemic remain uncertain. Consequently, we invite you to inquire into and analyze the aforementioned factors based on disclosed information and surveys, subsequently devising a set of models to reasonably predict the spread of the pandemic and evaluating the impact of containment strategies on the models.

Task 1: Assuming the spread of the pandemic is only related to the number of infected individuals, the population size, and vaccination rates, try to establish a mathematical model for the pandemic spread in a city/region of your choice.

Task 2: Based on disclosed information, take more diverse factors into consideration to reestablish the pandemic model. Identify key parameters and analyze the deviation between predicted and actual data. Leverage your model to qualitatively or quantitatively discuss the spread of pandemic among different cities/regions.

Task 3: Explore potential pandemic containment strategies and analyze their effectiveness qualitative or quantitatively. Based on disclosed information and surveys, quantify the impact of these strategies on your model and the



resumption of normal life and economy.

Submission Your solution paper should include a 1-page Summary Sheet. The body cannot exceed 20 pages for a maximum of 21 pages with the Summary Sheet inclusive. The appendices and references should appear at the end of the paper and do not count towards the 21 pages limit.