



Remote Work: *Fad or Future*

In the 1990s industry experts predicted that large proportions of workers in countries like the US and UK would start working from home¹; but by 2019 only about 5.5% of American and 4.7% of UK workers were telecommuting^{2, 3, 4}. The global pandemic that began in early 2020 brought an abrupt shift to remote work, and today the percentage of people who work remotely remains much higher than it was pre-pandemic in many countries⁵.

Among jobs that are remote-ready (i.e., where employees already are or could be working remotely), both employers and employees are making decisions about whether to go back to the workplace⁶. In response to labor shortages, some employers are feeling pressure to offer more options for remote work. Employees who could work from home may or may not choose to do so, and their decision may depend on many factors, including their age, commute time, childcare responsibilities, and even pressure to make the same choice as their co-workers.

If remote work continues to increase, possible societal impacts include changes to the environment due to decreased commuting, changes to the structure of various industries (e.g., increased virtual healthcare options), and shifts in population as people choose where they *want* to live rather than where their job dictates that they *have* to live⁷. Your team is asked to create models that will help predict whether the shift to remote work will last, and to what extent. A good model could serve as a foundation for all types of government agencies, businesses, and individuals to help them understand and make decisions about infrastructure, real estate, career choices, and much more.

- **Q1: Ready or Not**—Create a model which, for a given city, estimates the percentage of workers whose jobs are currently remote-ready. Apply your model to the cities below to make predictions for the percentage of remote-ready jobs in 2024 and 2027. You may need to account for how the inputs to your model will change over time.

US: Seattle, WA Omaha, NE Scranton, PA **UK:** Liverpool, England Barry, Wales

The provided Data Sheet should help you get started.

- **Q2: Remote Control**—Not all workers who can work from home choose to do so or are permitted by their employer to do so. Create a model that predicts whether an individual worker whose job is remote-ready will be allowed to and will choose to work from home.
- **Q3: Just a Little Home-work**—Synthesize your models from the first two questions to create a model which, for a given city, estimates the percentage of workers who will work remotely. Make predictions for the same cities you considered in Q1 for 2024 and 2027, and use those predictions to rank the cities in terms of the magnitude of impact that remote work will have on the city.

Your submission should include a one-page executive summary with your findings, written in the form of a Bureau of Labor Statistics brief to the President or Prime Minister, followed by your solution paper—for a maximum of 20 pages. If you choose to write code as part of your work to be eligible for the technical computing prize, please include it as an appendix and check the box on the upload page. **Any code appendix or reference page(s) will not count toward your 20-page limit.**

¹ <https://theconversation.com/50-years-of-bold-predictions-about-remote-work-it-isnt-all-about-technology-135034> (The Conversation, posted April 7, 2020)
² <https://havenlife.com/blog/cities-with-the-most-remote-workers/> (Haven Life Report, based on American Community Survey)
³ <https://data.census.gov/cedsci/table?q=American%20Community%20Survey%20Means%20of%20Transportation%20to%20Work> (U.S. Census Bureau)
⁴ <https://thehomeofficelife.com/blog/work-from-home-statistics>
⁵ <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/businessandindividualattitudestowardsthefutureofhomeworkinguk/apriltomay2021> (UK Office of National Statistics)
⁶ <https://www.pewresearch.org/social-trends/2022/02/16/covid-19-pandemic-continues-to-reshape-work-in-america/> (Pew Research Center)
⁷ <https://www.upwork.com/press/releases/economist-report-remote-workers-on-the-move> (Upwork)

Data Statement:

Various organizations and agencies collect data on demographics and employment that is relevant to this question. A small amount of data has been compiled and a link to an Excel spreadsheet with four worksheets of data is provided and summarized below. You are not required to use this data; that is, you may choose to use none, some, or all of this data and/or any additional data sources you may identify while working on this problem. Data sets in the real world are often incomplete or contain holes. Be sure to cite all resources used.

The following four data worksheets are in a spreadsheet found here <https://m3challenge.siam.org/node/559> with tabs marked accordingly:

- D1 City Employment Data
- D2 City Demographic Data
- D3 Remote Work Data
- D4 Remote Work Trends Over Time

If you use this data, please cite it as follows:

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MATLAB Users:

If you are trying to use Excel or any other spreadsheet data in MATLAB, you can import the data by double-clicking the files in MATLAB's "Current Folder" browser or use the [Import Data Button](https://www.mathworks.com/help/matlab/spreadsheets.html?ue) (<https://www.mathworks.com/help/matlab/spreadsheets.html?ue>) at the top of the Toolstrip.

Watch this quick MATLAB [video tutorial](https://www.youtube.com/watch?v=0hArv-UBKQQ&list=PLn8PRpmsu08oBSjfGe8WIMN-2_rwWFSgr&index=14) (https://www.youtube.com/watch?v=0hArv-UBKQQ&list=PLn8PRpmsu08oBSjfGe8WIMN-2_rwWFSgr&index=14) about importing spreadsheet data.

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