

MathWorks Math Modeling Challenge (M3 Challenge) 2022

REMOTE WORK: FAD OR FUTURE

Decisions about the use and impacts of working remotely, both on a micro and a macro level, affect many sectors including government agencies, industry structures, real estate values, the environment, population densities, and even career choices. Providing insight to make these important decisions using quantitative analysis of some of the variables is valuable. What percent of jobs are remote-ready? Of the jobs that are remote-ready, can we predict whether individual workers will be permitted to work remotely, and who will choose to do so? For a given city or metro area, can we predict the percentage of workers who will go remote? These issues and questions were all part of this year's MathWorks Math Modeling Challenge. Over a long weekend in late February, 612 teams composed of almost 2,800 students worked on solution papers of up to 20 pages, competing for \$100,000 in scholarships in [MathWorks Math Modeling Challenge \(M3C\), a program of SIAM](#).¹

M3 Challenge is a unique, internet-based math competition that provides a transformative, real-world experience for high school students in the United States and sixth form students in the United Kingdom, giving them the opportunity to demonstrate how the math they learn in class can be used to solve real problems. Now entering its 18th year, M3 Challenge has awarded more than \$1.75 million in scholarships since its launch in 2006.

A program of Society for Industrial and Applied Mathematics (SIAM) and sponsored by leading software developer MathWorks, M3 Challenge seeks to make math relatable to everyday life and to inspire students to study and pursue careers in applied math, computational and data sciences, and technical computing. Free of any entrance or participation fees, M3 Challenge has drawn the participation of more than 50,000 students (one third female), 4,000+ high schools, 6,000+ teachers, and 400+ Ph.D.-level judges. It has been endorsed by the National Association of Secondary School Principals (NAASP) since 2010.

Working in teams of three to five members under a 14-hour time constraint, participants use the mathematical modeling process, as well as other skills and experiences, to understand and define a particular problem, gather data and information, document their assumptions, and devise a math model to make predictions and provide insight for decisions about the issue before submitting their solution via online upload. The specific real-world problem that is posed each year is unknown to participants until they log in during Challenge weekend. Teams may opt to use technical computing to advance a model or better reveal its implications, and extra-credit awards exist for outstanding work in that area.

¹ Please see the 2022 M3 Challenge [problem statement](#) for what teams downloaded on Challenge weekend.

After four rounds of rigorous judging by ~150 professional applied mathematicians over the eight weeks immediately following Challenge weekend, six finalist teams and three technical computing awardees are selected to present their solutions to a panel of mathematical experts, in New York City on the last Monday in April. The 2022 presentations are [viewable on YouTube](#). 37 teams were recognized with scholarship prizes starting at \$1,000; the Champion team received \$20,000.

The following is the Champion team's paper from the MathWorks Math Modeling Challenge 2022 with some reviewer suggestions incorporated.

Complete information about MathWorks Math Modeling Challenge, including an archive with problems, solutions, and judge perspectives from each Challenge year, is available at <http://m3challenge.siam.org>.

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MathWorks Math Modeling Challenge (M3 Challenge)
A program of Society for Industrial and Applied Mathematics