A Mathematical Model of the Spread of a Pathogenic Disease in Rural South Dakota

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In response to the recent surge of viruses in rural areas, the international community has put an extra emphasis on preventing the spread of these diseases. The World Health Organization has recently declared a disease that began in a rural area, the Zika virus, as the fourth Public Health Emergency of International Concern. To model these viruses, mathematicians use the SIR model for epidemic growth and have adequately predicted the spread of diseases ranging from Ebola to the Swine Flu. In order to advance this model, I used the current SIR model and took into account people who are sick that are traveling to an urban area from a rural one, specifically within my home state of South Dakota. There is no way to find an explicit solution for this model by hand, so I used the computer software Maple 16 to graph the model. After using the software to create graphs of the spread of the disease, my model proved successful at predicting the spread of a disease while taking into account people traveling.

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