

### SCUDEM 2017 Problem A - Going Viral

Advertisers strive to reach the greatest number of people using the least amount of resources. The prevalence of social media and easy access to digital media has resulted in the development of strategies to create advertisements that go “viral.” Advertisers want a large number of people to share their message in ways that the number of people seeing the message grows rapidly in a short time.

This has been done in a variety of ways. One way is to target specific groups of people who are known to have broad audiences that can spread a message quickly. Another way is to make an advertisement available to a great number of social media outlets in a short time span. The hope is that the advertisement will be shared by enough people that the sharing itself will gain momentum and increase rapidly.

A good deal of research has been conducted to model the way information spreads. Many of these models focus on the structure and size of the network of people. In practice the networks of people are already established and can be vast and quite complicated. Is it possible to construct a simpler model that can describe the way the number of people are exposed to an idea and predict viral growth?

In particular, an advertising company would like to know the minimal amount of resources that can be spent and result in a rapid expansion of the number of people exposed to a message. For example, is there some minimal number of people who must be exposed to their message in a short time to cause the message to go viral? If an advertisement does not go viral quickly after release how likely is it that it will never go viral, or is it possible to add resources in a way that can promote an advertisement so that it does go viral if at first it does not appear to be successful?