A town recently added a new high speed internet service provider so that it now has three ISPs: A, C, and V Each ISP runs promotions to entice customers to switch to their service, and the effects over the last year has been:

15% of the A customers switch to C and 10% switch to V
15% of the C customers switch to A and 5% switch to V
5% of the V customers switch to A and 10% switch to C

Assume that these trends continue.

1. If A currently has 50% of the customers, C has 30% and V has 20%, what will the distribution of customers be after 1 year? 3 years? 10 years? 20 years?
2. How does the answer change if currently A has 10%, C has 20% and V has 70%?
3. What if V currently has *all* the customers?
4. What will the impact be to the scenario in #1 if A improves its retention so that 10% of its customers switch to C and 5% switch to V?

Few other applications of Markov Chains

- Trees in a forest can be classified into four age categories:
  Saplings, Young, Mid, Mature
  - If can determine probability of each group living or dying over 5 year period by observation, can predict long term distribution
  - If plant new forest, $x_0 = (1, 0, 0, 0)$ what is distribution in 30 years?

- Historically, parents' income is good predictor of child's income as an adult, with some upward or downward movement.
  If trends continue, can predict distribution of incomes

- Google's page rank algorithm is essentially a Markov Chain model based on the graph that represents links on the web

- What are the best properties to own in Monopoly?
  cf. Abbott & Richey, `https://doi.org/10.2307/2687519`