

Math 20 Markov Chains

1. Smallville is the only town in its mostly rural county in Kansas. It is found that every year about 20% of those living in the town of Smallville move to the surrounding countryside and about 30% of those living in the countryside move into the town of Smallville.
 - (a) If 40% of the population of the county currently resides in the town of Smallville, what percentage of the population of the county is likely to live in Smallville 1 year from now? 2 years from now?
 - (b) What percentage of the county's population can be expected to sides in the town of Smallville after many years?

2. A mouse is placed in a box with nine rooms arranged in a 3×3 grid. Each room is connected to the rooms adjacent to it. Assume that each minute it is equally likely that the mouse goes through any door in the room or stays put in the room.
 - (a) If the mouse is initially placed in the center room, what is the probability that it will be in the upper-left square after three minutes?
 - (b) What is the probability that it will be in the upper-left square after many minutes have gone by?