

1. Two brands of a product are available - Brand A and Brand B. Of those who buy Brand A, 80% will buy it the next time and the rest will buy brand B. Of those who buy Brand B, 40% will buy it the next time and the rest will buy Brand A..
  - (a) Construct the **transition matrix** for this situation.
  - (b) Suppose that people tend to buy this product every week and that this week, 30% of the people buy Brand A and the rest buy Brand B. What is the **initial-state distribution matrix** for this situation?
  - (c) What percentage will buy Brand A next week?
  - (d) What percentage will buy Brand A the week after next?
  
2. In state senate elections in a certain state, it has been determined that 70% of those who voted for a Democrat will vote for a Democrat in the next election, 20% will vote for a Republican and 10% for an Independent. Of those who voted for a Republican, 35% will vote for a Democrat, 60% for a Republican and 5% for an Independent in the next election. Of those who voted for an Independent, 30% will vote for a Democrat, 30% for a Republican and 40% for an Independent.
  - (a) Construct the **transition matrix** for this situation.
  
  - (b) Suppose that elections in a certain town are held yearly. If 45% voted for a Democrat, 50% for a Republican and 5% for an Independent in 2000, what is the **initial-state distribution matrix** for this situation?
  - (c) What percentage will vote for each party in 2001?
  - (d) If the trend continues, predict the percentage which will vote for each party in 2005.

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3. Three supermarkets serve a certain section of a city. During the upcoming month, supermarket A is expected to keep 80% of its customers, lose 5% to supermarket B and lose 15% to C. Supermarket B is expected to keep 90% of its customers and lose 5% to each A and C. Supermarket C is expected to keep 75% of its customers, lose 10% to A and lose 15% to B.
- (a) Construct the **transition matrix** for this situation.
- (b) If the January market shares of A, B and C are 40%, 30% and 30% respectively, what is the **initial-state distribution matrix** for this situation?
- (c) What share of the market will be held by each supermarket in March?
- (d) If the trend continues, what will the market share be for each supermarket in June?