

1. Consider a model for the long-term dining behavior of the students at College USA. It is found that 25% of the students who eat at the college's Grease Dining Hall return to eat there again, whereas those who eat at Sweet Dining Hall have a 93% return rate. These are the only two dining halls available on campus, and assume that all students eat at one of these halls. Formulate a model to solve for the long-term percentage of students eating at each hall.
2. Consider adding a pizza delivery service as an alternative to the dining halls. Table 6.3 gives the transition percentages based on a student survey. Determine the long-term percentages eating at each place.

Table 6.3 Survey of dining at College USA

		Next state		
		Grease Dining Hall	Sweet Dining Hall	Pizza delivery
Present state	Grease Dining Hall	0.25	0.25	0.50
	Sweet Dining Hall	0.10	0.30	0.60
	Pizza delivery	0.05	0.15	0.80

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3.

A farmer has 30 acres on which to grow tomatoes and corn. Each 100 bushels of tomatoes require 1000 gallons of water and 5 acres of land. Each 100 bushels of corn require 6000 gallons of water and 2.5 acres of land. Labor costs are \$1 per bushel for both corn and tomatoes. The farmer has available 30,000 gallons of water and \$750 in capital. He knows that he cannot sell more than 500 bushels of tomatoes or 475 bushels of corn. He estimates a profit of \$2 on each bushel of tomatoes and \$3 on each bushel of corn.

- a. How many bushels of each should he raise to maximize profits?
- b. Next, assume that the farmer has the opportunity to sign a nice contract with a grocery store to grow and deliver at least 300 bushels of tomatoes and at least 500 bushels of corn. Should the farmer sign the contract? Support your recommendation.
- c. Now assume that the farmer can obtain an additional 10,000 gallons of water for a total cost of \$50. Should he obtain the additional water? Support your recommendation.