the two lines. Finally, David arrives, sees Amy, Brian, and Cassandra waiting in line, and enters one of the two lines. Assume a player's payoff equals 5 minus the number of shoppers in line ahead of him or her.

a. Derive the extensive form game.

b. Now suppose that by the time that David shows up, Amy has already checked out. Thus, only Brian and Cassandra are in line. Derive the extensive form game.

15. Kickstarter (www.kickstarter.com) provides a platform for raising venture capital through crowdsourcing. A project creator sets a funding target and posts the project at Kickstarter. People then decide how much money to pledge. If the total pledges are at least as great as the funding target, then the pledges are converted into contributions and the project is funded. Though the contributors do not own a share of the project, they can receive rewards from the project creator. If the pledges fall short, then the project is not funded. Assume there are three players: one project creator and two potential contributors. The project creator chooses between a funding target of $1,000 and $1,500. With the funding target posted at Kickstarter, the two contributors simultaneously decide whether to pledge $250 or $750. Assume the project creator's payoff equals three times the amount of funding (which is zero if contributions are less than the funding target). A contributor's payoff is zero when the project is not funded (irrespective of the pledge made), and is two times the total amount of pledges minus three times the contributor's own pledge when it is funded.

a. Write down the extensive form game.

b. Write down each player's strategy set.

c. Write down the strategic form game.

16. Consider drivers who commonly traverse a major highway. Each driver is deciding whether to buy E-ZPass. E-ZPass electronically charges a driver for going through a toll, which avoids having to stop and hand over money. E-ZPass costs $4 and allows a driver to go through the E-ZPass lane. Without E-ZPass, a driver goes through the Cash lane. With either lane, the toll is $6. The average time it takes for a car to get through the E-ZPass line is 10 seconds multiplied by the number of cars in the E-ZPass lane (which is assumed to equal the number of cars with E-ZPass). For the Cash lane, the average time it takes for a car to get through is 30 seconds multiplied by the number of cars in the Cash lane (which is assumed to equal the number of cars without E-ZPass). The value of a driver's time is 30 cents per minute. Assume there are 100 drivers, each of whom has a payoff equal to 20 minus the value of time spent in line minus expenditure (the latter is $4 without E-ZPass and $10 with E-ZPass). Drivers make simultaneous decisions about whether or not to buy E-ZPass.

a. The strategy set for a driver is (*E-ZPass, No E-ZPass*). Derive a driver's payoff function depending on his choice and the choices of the other 99 drivers.

b. Now suppose a driver with E-ZPass can use either lane. Assume that it takes the same amount of time to go through the Cash lane whether a driver has E-ZPass or not. Drivers without E-ZPass can still go through only the Cash lane. The strategy set for a driver is (*E-ZPass & E-ZPass lane, E-ZPass & Cash lane, No E-ZPass & Cash lane*). Derive a driver's payoff function, depending on her choice and the choices of the other 99 drivers.

12. Alexa and Judd live in Boston and have been dating for about a year and are fairly serious. Alexa has been promoted to Regional Manager and been given the choice of assignments in Atlanta, Boise, and Tucson. After she makes her choice (and this is observed by Judd), he'll decide whether to stay in Boston or follow Alexa. The payoffs associated with the six possible outcomes are in the accompanying table.
    a. Derive the extensive form game.
    b. Derive the strategic form game.

Alexa's choice	Judd's choice	Alexa's payoff	Judd's payoff
Atlanta	Move	5	6
Atlanta	Stay	3	3
Boise	Move	2	1
Boise	Stay	1	3
Tucson	Move	7	4
Tucson	Stay	4	3

13. When he released his new novel *The Plant*, the best-selling author Stephen King chose to make early chapters downloadable for free on his website www.stephenking.com but he also asked readers to make voluntary contributions. Furthermore, he stated that he would not release subsequent chapters unless people contributed: "Remember: Pay and the story rolls. Steal and the story folds." In modeling this approach to selling a book, suppose there are just three readers: Abigail, Carrie, and Danny. All chapters have been released except for the final one which, of course, has the climax. For Abigail or Carrie, if the final chapter is released then each receives a payoff of 5 minus how much money she contributed. For Danny, if the final chapter is released then he receives a payoff of 10 minus how much money he contributed. If the final chapter is not released then each reader receives a payoff of 2 minus how much he or she contributed. Abigail and Carrie are deciding between contributing nothing and $2. Danny is deciding between $2 and $4. For the final chapter to be released, at least $6 must be raised.
    a. Assume all three readers make simultaneous contribution decisions. Write down the strategic form game.

    Now suppose Danny contributes first, and then Abigail and Carrie make simultaneous contribution decisions after observing Danny's contribution.
    b. Write down the extensive form game.
    c. Write down each player's strategy set.
    d. Write down the strategic form game.

14. There are four shoppers in a store—Amy, Brian, Cassandra, and David—who sequentially show up at two checkout lines: line number 1 and line number 2. Initially, both checkout lines are empty. Amy shows up first, sees no one in either line, and chooses one of the two lines. Brian shows up next, sees which line Amy entered, and chooses between the two lines. Next, Cassandra shows up. She sees Amy and Brian in line and chooses between