## Problems

23.

HighFlyer Airlines wants to build new airplanes with greatly increased cabin space. This will allow HighFlyer Airlines to give passengers more comfort and sell more tickets at a higher price. However, redesigning the cabin means rethinking many other elements of the airplane as well, like engine and luggage placement and the most efficient shape of the plane for moving through the air. HighFlyer Airlines has developed a list of possible methods to increase cabin space, along with estimates of how these approaches would affect the plane's operating costs and ticket sales. Based on these estimates, [Table 13.5](#ch13mod01_tab04) shows the value of R&D projects that provide at least a certain private rate of return. Column 1 = Private Rate of Return. Column 2 = Value of R&D Projects that Return at Least the Private Rate of Return to HighFlyer Airlines. Use the data to answer the following questions.

|  |  |
| --- | --- |
| Private Rate of Return | Value of R&D |
| 12% | $100 |
| 10% | $200 |
| 8% | $300 |
| 6% | $400 |
| 4% | $500 |

Table 13.5

1. If the opportunity cost of financial capital for HighFlyer Airlines is 6%, how much should the firm invest in R&D?
2. Assume that the social rate of return for R&D is an additional 2% on top of the private return; that is, an R&D investment that had a 7% private return to HighFlyer Airlines would have a 9% social return. How much investment is socially optimal at the 6% interest rate?

24.

Assume that the marginal private costs of a firm producing fuel-efficient cars is greater than the marginal social costs. Assume that the marginal private benefits of a firm producing fuel-efficient cars is the same as the marginal social benefits. Discuss one way that the government can try to increase production and sales of fuel efficient cars to the socially desirable amount. *Hint*: the government is trying to affect production through costs, not benefits.

25.

Becky and Sarah are sisters who share a room. Their room can easily get messy, and their parents are always telling them to tidy it. Here are the costs and benefits to both Becky and Sarah, of taking the time to clean their room: If both Becky and Sarah clean, they each spends two hours and get a clean room. If Becky decides not to clean and Sarah does all the cleaning, then Sarah spends 10 hours cleaning (Becky spends 0) but Sarah is exhausted. The same would occur for Becky if Sarah decided not to clean—Becky spends 10 hours and becomes exhausted. If both girls decide not to clean, they both have a dirty room.

1. What is the best outcome for Becky and Sarah? What is the worst outcome? (It would help you to construct a prisoner’s dilemma table.)
2. Unfortunately, we know that the optimal outcome will most likely not happen, and that the sisters probably will choose the worst one instead. Explain what it is about Becky’s and Sarah’s reasoning that will lead them both to choose the worst outcome.