

Exercise 2.1.

Northam Airlines is trying to decide how to partition a new plane for its Chicago–Detroit route. The plane can seat 200 economy class passengers. A section can be partitioned off for first class seats but each of these seats takes the space of 2 economy class seats. A business class section can also be included, but each of these seats takes as much space as 1.5 economy class seats. The profit on a first class ticket is, however, three times the profit of an economy ticket. A business class ticket has a profit of two times an economy ticket's profit. Once the plane is partitioned into these seating classes, it cannot be changed. Northam knows, however, that the plane will not always be full in each section. They have decided that three scenarios will occur with about the same frequency: (1) weekday morning and evening traffic, (2) weekend traffic, and (3) weekday midday traffic. Under Scenario 1, they think they can sell as many as 20 first class tickets, 50 business class tickets, and 200 economy tickets. Under Scenario 2, these figures are 10, 25, and 175. Under Scenario 3, they are 5, 10, and 150. You can assume they cannot sell more tickets than seats in each of the sections.

Knowing this:

- Identify the known parameters
- Identify the uncertain parameters
- Identify the first-stage decisions
- Identify the second-stage decisions
- Formulate the stochastic optimization problem that maximizes the expected profit of the company and solve it
- Formulate the expected value problem and solve it
- Find the value of the stochastic solution (VSS)