

## 1 Homework Questions

1. The booking limits for four fare classes are given as  $b = (b_1, b_2, b_3, b_4) = (20, 15, 5, 2)$ . Suppose that until now 5 bookings are made for class 2 and 4 bookings are made for class 3. The following parts are independent.
  - a) Process a request for 2 bookings for class 4. Decide on accept/reject and then report the cumulative booking vector  $B$ .
  - b) Process a request for 6 bookings for class 1. Decide on accept/reject and then report the cumulative booking vector  $B$ .
  - c) Process a request for 2 bookings for class 3. Decide on accept/reject and then report the cumulative booking vector  $B$ .
  - d) Process a cancellation of 2 bookings for class 3. Report the cumulative booking vector  $B$ .
  
2. [**Learning residual capacity**] Airlines increase the price of a ticket when the unsold (unbooked, residual) capacity on the associated flight is low. If consumers know the number of unbooked seats on a flight, they can either delay or immediately book for a seat. The delay would happen when the number of booked seats is high. From a consumer's point of view, the issue is to learn the residual capacity on a flight. This information was generally not available circa 2009 when this question was first written.
  - a) Circa 2009, a cumbersome and indirect method of learning the residual capacity was by quizzing the reservation system. For example, if you want to learn whether residual capacity is more than 4 or not, you can attempt to reserve 4 seats. Suppose that we are sure that the residual capacity is between 1 and 4 seats. Make a decision tree to ensure that residual capacity is 1, 2, 3, or 4. Basically, decide on what number of seats you will request initially and afterwards depending on acceptance/rejection of earlier requests.
  - b) Circa 2011, American Airlines started to provide passengers with an outline (schematic view) of the cabin that shows available and reserved seats before a passenger books a seat. From this outline, the passenger can deduce the number of available seats and strategically time (for example, delay) their ticket purchases. Despite the discussion above, what could be the reason for American to provide this outline?
  - c) Consider Delta and United Airlines and check their websites to see if they currently provide information on residual capacity.
  - d) Some airlines restrict the number of seats that can be reserved at once. Report these limits, if any, for American, Delta and United airlines.