

1. The CEO of AgrerssiveMarketing airline just realized that the airline's strategic planning unit has put too many flights into the schedule -- there is no way that AM can possibly fly all the flights with the available fleet. The CEO wants to fly as many passengers as possible, no matter what cost the airline will incur. Modify the Fleet Assignment math program to model this.
Here's notation for some parameters that you may find helpful: let c_f be the capacity of an airplane of fleet type f ; let p_l be the number of passengers that want to fly link l .
Answer is written in white font below; select the next line to see it.
2. Egalite airline has its main hub in Middletown. Mrs. Over Lee Balanced, the head of the Equal Resource Management department at Egalite, requests that the number of Eastbound and Westbound departures from Middletown are equal to each other. Model this in the mathematical programming formulation of the FA.
3. The Business airline only cares about business passengers. The management believes that business passengers like to arrive to their destination in the morning, and thus wants all Eastbound departures to happen after noon. Model this in the mathematical programming formulation of the FA.
4. Aircraft type f produces n_f noise when landing at Quiet city. Your airline is not allowed to produce more than B noise per day at Quiet. Model this in the math program for FA.
5. Fearing a strike by narrow-body cabin personnel, an airline wants to fly as few flights as possible with narrow-body planes. Model this in the mathematical programming formulation of the FA.

6. Let b_f denote the number of business seats on a plane of type f . How can you model the requirement that overall, at most 10% of the seats on your planes are business seats?

7. [This problem mixes FA and probability; there will be no such problem on the exam, but it may be good for practice]
 A small airline operates each of its aircraft every day. During the snowstorm season every airport s has probability p_s of being closed in the morning; the closures at different airports are independent events. A closure means that all aircraft departing from the closed airport are delayed for the whole day. Model the requirement that the expected number of delayed aircraft should be at most 15.3 .

8. The number Y of business passengers on a 100-seat plane is distributed as follows: $P\{Y=5\} = P\{Y=15\} = P\{Y=20\} = 1/3$; the leisure passengers can fill all 100 seats. The leisure and business tickets are sold for 300 and 400 respectively. How many seats should you reserve for the business pax to maximize the expected revenue?

9. Answer the previous question assuming Y is a Poisson random variable with mean 20. You may need a calculator or computer for this (such a problem will not appear on the exam).

10. Can the number of business passengers Y be distributed as follows: $P\{Y=5\} = P\{Y=15\} = P\{Y=20\} = 1/2$?

11. You operate a 10-seat business jet and get revenue only from the business pax; the revenue is \$200/pax. Assume that the number Y of business passengers who want to take the flight is distributed as $p\{Y=6\}=\frac{1}{2}$, $p\{Y=10\}=\frac{1}{2}$. What is your expected revenue?
12. You operate a 10-seat business jet and get revenue only from the business pax; the revenue is \$100/pax. Assume that the number Y of business passengers who want to take the flight is distributed as $p\{Y=6\}=\frac{1}{2}$, $p\{Y=10\}=\frac{1}{2}$. What is the variance of your revenue?
13. Douglas airline is soon to sell its MD-11 plane. Because of that, Douglas temporarily does not care about maximizing the profit, but instead wants to use the MD-11 as much as possible. That is, the airline wants to use MD-11 on as many links as possible. Model this by modifying the mathematical program for the fleet assignment problem.