For a single route example, our problem is to find the optimal number of discount seats and regular seats to sell to maximize revenue.

We'll assume that the price of regular seats is $617, and the price of discount seats is $238.

Also, let's assume that we forecasted the demand of regular seats to be 100, and the demand of discount seats to be 150.

The capacity of our airplane is 166 seats.

Let's go ahead and formulate this mathematically as a linear optimization problem.

The first step is to decide what our decisions are, or the variables in our model.

We need to decide how many regular seats we went to sell.

We'll call the number of regular seats we sell R. We also need to decide the number of discount seats we want to sell.

We'll call the number of discount seats we sell D.

The second step is to decide what our objective, or our goal, is.

In this case, it's to maximize the total revenue to the airline.

The revenue from each type of seat is equal to the number of that type of seat sold times the seat price.

In the case of regular seats, this is $617 times R, the number of regular seats we sell.

And for discount seats, this is $230 times D, the number of discount seats we sell.

We sum these together to get the total revenue, and our objective is to maximize this sum.

The third step is to define the constraints, or limits, of our decisions.

One constraint is that American Airlines can't sell more seats than the aircraft capacity, which is 166 seats.

So the total number of seats sold, R + D has to be less than or equal to the capacity of 166.

Additionally, American Airlines shouldn't sell more seats than the demand for each type of seat.

So the regular seats, R, shouldn't exceed 100.

So R should be less than or equal to 100.

And the discount seats, D, can't exceed 150.

So D should be less than or equal to 150.

The final step is to make sure our variables are taking reasonable values.

In this case, it wouldn't make sense to sell a negative number of seats, so we need to make sure that both R and D are greater than or equal to 0.

So our entire problem is to maximize total airline revenue, subject to the constraints that seats sold can't exceed capacity, seats sold can't exceed demand, and the seats sold can't be negative.

Mathematically, this can be written as maximize 617*R + 238*D, the total revenue, subject to the constraints: R + D is less than or equal to 166, the capacity constraint; R less than or equal to 100, and D less than or equal to 150, which are the demand constraints; and R and D are both greater than or equal to 0.

This is called a linear optimization problem.

In the next video, we'll see how to solve this problem using the software, LibreOffice.