AIRPLANE SEAT ASSIGNMENT PROBLEM SOLUTION

Seats are numbered 1,2,3…through N

Passengers are labeled according to their assigned seat number, 1,2,3 …through n

I’m assuming, for simplicity, that the passengers board the airplane in the order of their seating number assignment, since the solution is independent of the order.

We calculate the probability that the nth passenger (the last passenger) entering the plane gets his assigned seat by following the build up of the possible seat assignement configurations:

Let the first sequence of the numbers below represent the position of the airplane’s seat numbering 1 to N, from left to right:

1 2 3 4 5 6……N

And as an example, the numbers in the second sequence indicate the passengers’ assigned seat number, and their position in the actual selected seat.

n 2 1 4 5………3

The buildup of the possible configurations is as follows:

Passenger #1 selects his assigned seat, so all the other passengers get their assigned seats, or Passenger #1 selects the Nth with the remaining passengers selecting their assigned seat except for the nth passenger who is forced to occupy seat #1. The resultant two configurations are:

1 2 3 4 5 6…….n

n 2 3 4 5 5…….1

Passenger #1 selects seat #2.

If Passenger #2 selects either the first or last seat the following two configurations result:

2 1 3 4 5 6……n

n 1 3 4 5 6……2

If Passenger #2 selects seat #3, then Passenger #3 has the following choisces:

3 1 2 4 5 6……n

n 1 2 4 5 6……3

as well as

4 1 2 3 5 6…….n

n 1 2 3 5 6…... 4

as well as

5 1 2 3 4 6……n

n 1 2 3 4 6……5

as well as

6 1 2 3 4 5……n

n 1 2 3 4 5……6

and so on, but always in a binary selection with the nth passenger either in the first or Nth seat, which results in a 50% probability.