Answer on question #45332 – Math - Statistics and Probability

Question: An airline knows that 5% of the people making reservations on a certain flight will not turn up. Consequently their policy is to sell 52 tickets for a flight that can accommodate only 50 passengers. What is the probability that there will be a seat for every passenger who turns up?

Solution: Denote A = "there will be a seat for every passenger who turns up". Basically, A is an event, when the number of people, who bought tickets and not turns up is 2, or more. First, let's calculate P(not A), the probability, that the number of people, who not turns up (denote this number as n) is 0, or 1. There are 52 persons, who bought tickets, and any of them will not turn up with a probability 0.05. This is a Bernoulli scheme.

$P(not\ A) = P(n = 0) + P(n = 1) = \binom{52}{0}0.05^0 0.95^{52} + \binom{52}{1}0.05^1 * 0.95^{51} = 0.95^{51}(0.95 + 52 * 0.05) = 3.55 * 0.95^{51} = 0.2594969.$

Now we can calculate P(A)

$$P(A) = 1 - P(not\ A) = 1 - 0.2594969 = 0.7405031.$$

Answer: P = 0.7405031.