

### Answer on Question #51325 – Math – Statistics and Probability

Musquodoboit World Airways operates a fleet of small passenger planes. Like most major airlines it has a problem with no-shows, people who make reservations, but don't show up for their flight or cancel at the last minute. Their no-show rate is 20%, comparable to the industry average. One type of aircraft used by MWA can accommodate up to 16 passengers.

- a)** If they accept 16 reservations, what is the probability that the plane departs with every seat filled (0 no-shows)?
- b)** As is common in the industry, MWA overbooks its flights. For this size aircraft, it accepts up to 17 reservations. Suppose that MWA has accepted 17 reservations for a particular flight. What is the probability that everyone who shows up will get a seat?

#### Solution

- a)** It is Binomial Distribution problem with  $n = 16$  and  $p(\text{no show}) = 0.2$ ;  $q = 1 - p = 0.8$ .

The probability that the plane departs with every seat filled (0 no-shows) is

$$P(x = 0) = \frac{16!}{(16 - 0)! 0!} 0.2^0 \cdot 0.8^{16-0} = 0.8^{16} = 0.02815.$$

- b)** It is Binomial Distribution problem with  $n = 17$  and  $p(\text{no show}) = 0.2$ ;  $q = 1 - p = 0.8$ .

The probability that everyone who shows up will get a seat is

$$\begin{aligned} P(\text{at least 1 no-show out of 17}) &= 1 - P(0 \text{ no-shows out of 17}) = 1 - \frac{17!}{(17 - 0)! 0!} 0.2^0 \cdot 0.8^{17-0} \\ &= 1 - 0.8^{17} = 1 - 0.0225 = 0.9775. \end{aligned}$$

**Answer: a) 0.02815; b) 0.9775.**