

## Answer on Question #82255 — Math — Statistics and Probability

### Question

Here is a 20.13% probability that any new IT company will generate a profit in their first year. If 5 companies are selected at random, find

**a.**

The probability that exactly 3 will generate profit in the first year?

**b.**

Less than 3 will generate profit in the first year?

**c.**

The average number of new IT companies that will generate profit in their first year?

### Solution

$$p = 0.2013$$

$$\text{a) } P(n = 3) = C_3^5 * p^3 * (1 - p)^2 = \frac{4 * 5 * 0.2013^3 * 0.7987^2}{2} = 0.052$$

$$\begin{aligned} \text{b) } P(n < 3) &= P(n = 0) + P(n = 1) + P(n = 2) = \\ &= p^0 * (1 - p)^5 + C_1^5 * p^1 * (1 - p)^4 + C_2^5 * p^2 * (1 - p)^3 = \frac{1 * 0.7987^5}{1} + \\ &+ \frac{5 * 0.2013^1 * 0.7987^4}{1} + \frac{4 * 5 * 0.2013^2 * 0.7987^3}{2} = 0.3250 + 0.4096 + 0.2065 = 0.9411 \end{aligned}$$

$$\text{c) } 0.2013 * 5 = 1.0065 \text{ is the average number of new IT companies that will generate profit in their first year.}$$

**Answer:** a) 5.2%; b) 94.11%; c) 1.0065.