

**Answer on Question #56184 – Math – Statistics and Probability**

The probability that a bakery customer will order a birthday cake is .04.

- a) What is the expected number of customers until the first birthday cake is ordered?
- b) What is the probability the first cake order occurs within the first 20 customers? (Round your answer to 4 decimal places.)

**Solution**

The geometric distribution describes the number of Bernoulli trials until the first success is observed.

$$P(X \leq x) = 1 - (1 - \pi)^x$$

Let  $X$  is the number of customers until the first birthday cake is ordered. Then,  $X$  has a geometric distribution with  $\pi = 0.04$ .

- a) The expected number of customers until the first birthday cake is ordered is

$$\mu = \frac{1}{\pi} = \frac{1}{0.04} = 25 \text{ customers.}$$

- b) The probability the first cake order occurs within the first 20 customers is

$$P(X \leq 20) = 1 - (1 - 0.04)^{20} = 0.5580.$$