

### Answer on Question #46532 – Math – Statistics and Probability

Suppose that, on average, 1 person in 1000 makes a numerical error in preparing his or her income tax return. If 10,000 forms are selected at random and examined, find the probability that at most 2 of the forms contain an error.

#### Solution

We have  $n = 10000$  is large and  $p = \frac{1}{1000}$  is near 0, then the binomial distribution can be approximated by the Poisson distribution with parameter  $\lambda = np = 10000 \cdot \frac{1}{1000} = 10$ .

The probability that at most 2 of the forms contain an error is

$$P(\text{at most } 2) = P(0) + P(1) + P(2).$$

Using Poisson distribution:

$$P(\text{at most } 2) = \frac{10^0 e^{-10}}{0!} + \frac{10^1 e^{-10}}{1!} + \frac{10^2 e^{-10}}{2!} = e^{-10}(1 + 10 + 50) = 0.0028.$$

**Answer: 0.0028.**