

Answer on Question #72703, Math / Statistics and Probability

On average, a textbook author makes two word-processing errors per page on the first draft of her textbook. What is the probability that on the next page she will make

- (a) 4 or more errors?
- (b) no errors?

Solution

Let X be the number of errors made in one page. Then X has a Poisson distribution with $\lambda = 2$ per page

$$p(x; \lambda) = \frac{e^{-\lambda} \lambda^x}{x!} \text{ for } x = 0, 1, 2, \dots$$

- (a) 4 or more errors

That is

$$\begin{aligned} P(X \geq 4) &= 1 - P(X \leq 3) = 1 - (p(0; 2) + p(1; 2) + p(2; 2) + p(3; 2)) = \\ &= 1 - \left(\frac{e^{-2} 2^0}{0!} + \frac{e^{-2} 2^1}{1!} + \frac{e^{-2} 2^2}{2!} + \frac{e^{-2} 2^3}{3!} \right) = 1 - e^{-2} \left(1 + 2 + 2 + \frac{4}{3} \right) \approx 0.1429 \end{aligned}$$

- (b) no errors

That is

$$P(X = 0) = p(0; 2) = \frac{e^{-2} 2^0}{0!} = e^{-2} \approx 0.1353$$