# 17. Exercise: ML estimation

Exercises due May 1, 2020 05:29 IST *Completed*

## Exercise: ML estimation

1/1 point (graded)

Let $K$ be a Poisson random variable with parameter $\lambda$: its PMF is

$$p_K(k;\lambda) = \frac{\lambda^k e^{-\lambda}}{k!}, \qquad \text{for } k = 0, 1, 2, \ldots.$$

What is the ML estimate of $\lambda$ based on a single observation $K = k$? (Your answer should be an algebraic function of $k$ using standard notation.)

k

✔ **Answer:** k

**Solution:**

We maximize the logarithm of the PMF, which is $k \ln \lambda - \lambda - \ln(k!)$. Setting the derivative of this expression with respect to $\lambda$ to 0, we obtain $(k/\lambda) - 1 = 0$, so that $\hat{\lambda}_{ML} = k$.

Submit You have used 2 of 3 attempts

Answers are displayed within the problem

## Discussion

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? Is this going to require taking derivative of k! ??? 2
Sorry, I can do the numerator, but the denominator, I don't know. Beyond my current calculus skills (curr...

mark not granted 3
[staff] I got this answer correct but it has not been added to my total score.

? Poisson process? 3
Hey, I'm a bit stuck on this question - and I'm unsure if this is because it is about Poisson or about Maxi...

What does it mean for MLE to be independent of sample size ? 3

Is it neccesary to use the logarithm? 3
Rather than differentiating the logarithm of the PMF, I simply took the derivative of the PMF (using the p...