Numerical Maximum Likelihood

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Data 401

Example

We want to model the number of fish that are caught in a pond.

1. Count variables are often modeled using a Poisson distribution. Its p.m.f. is

\[ P(Y = y) = e^{-\lambda} \frac{\lambda^y}{y!}. \]

2. In some applications, we only record the count if it is non-zero. (For example, if no fish are caught on a given day, we might not even record 0.) In these situations, a zero-truncated Poisson model is often used. Its p.m.f. is

\[ P(Y = y \mid Y > 0) = \frac{\lambda^y}{(e^\lambda - 1)y!}. \]

Yesterday, 4 fish were caught in the pond. Find the MLE of \( \lambda \) under the two models.