Maximum likelihood estimation

Stat 250

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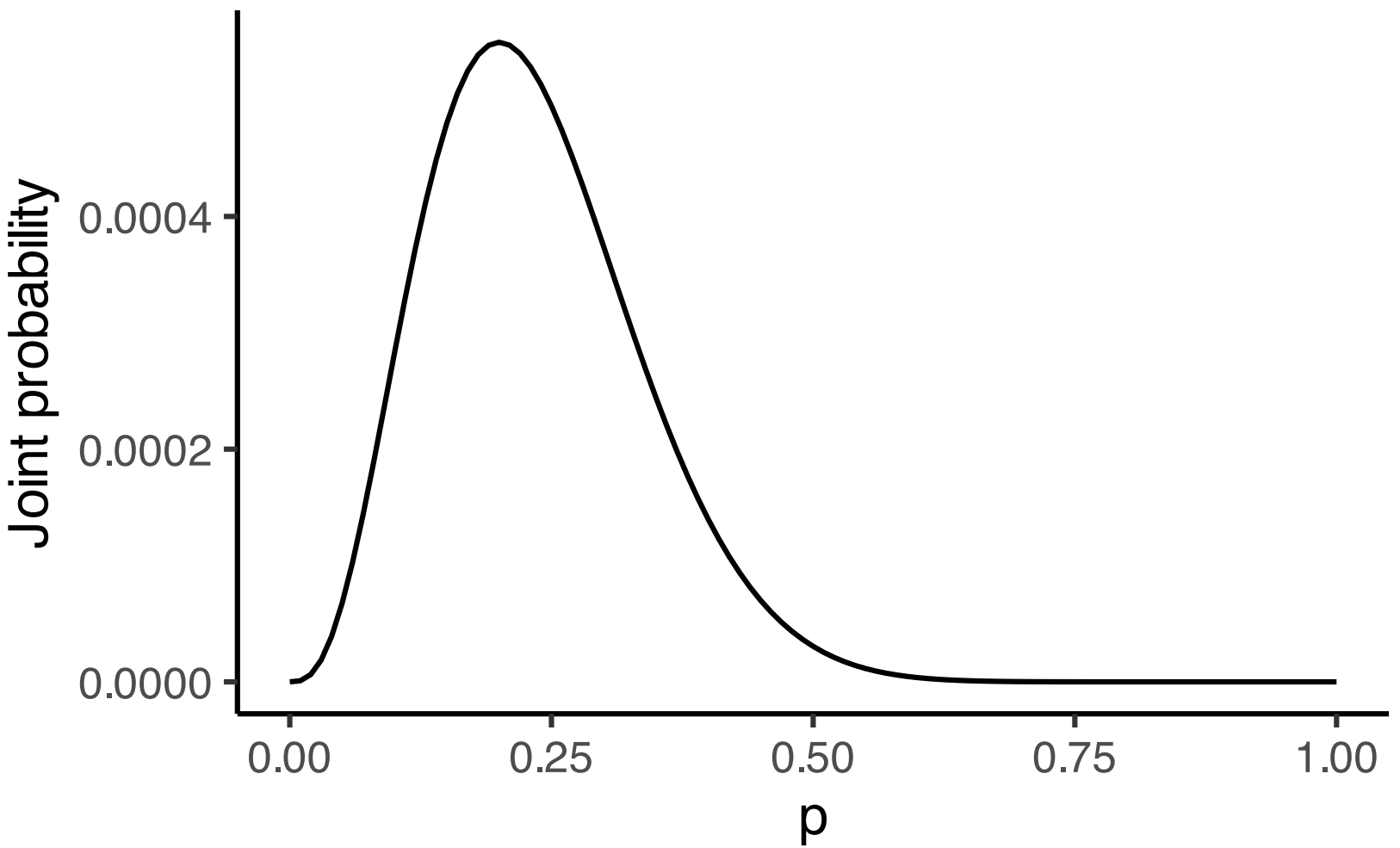
Joint probability, with a twist

$$P(X_1 = 3, X_2 = 5, X_3 = 7) = (1 - p)^{12} p^3, \quad 0 < p < 1$$



Your turn

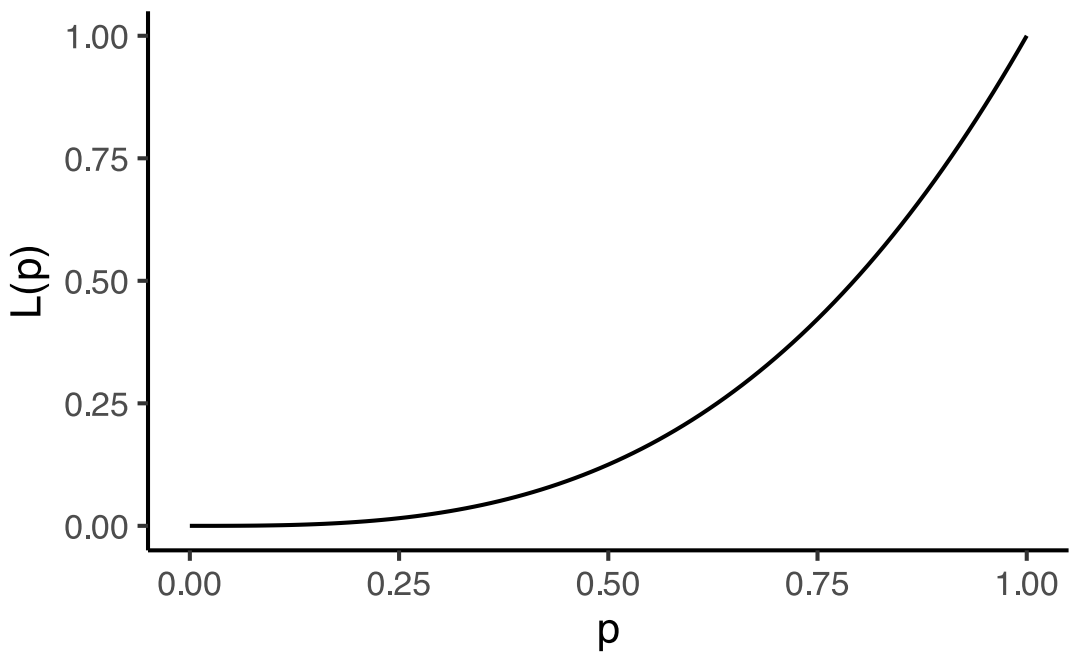
1. Let $Y_1, \ldots, Y_n$ be i.i.d. draws from a Poisson(λ) distribution. Find the maximum likelihood estimator for λ.
2. Let $X_1, \ldots, X_n$ be a random sample (that is, i.i.d. draws) from a distribution with PDF

$$f(x|\theta) = (\theta + 1)x^{\theta}, \quad 0 \leq x \leq 1.$$

   Find the maximum likelihood estimator for a random sample of size n.

Problematic case

Suppose $X_1 = X_2 = X_3 = 1$, then $L(p) = p^3$, $0 < p < 1$.



$L(p)$ is a big as possible when p is as large as possible

But $p < 1$, so p can get arbitrarily close to 1, but can't reach it

$\Longrightarrow$ MLE does not exist!