STAT 5113: Statistical Inference

Homework 4 – Due March 5, 2018

All of the following problems refer to the "Armadillo kills" data discussed in class. The data are summarized in the table below for your convenience.

Kills	Count
0	29
1	8
2	1

Use a $\mathcal{P}oi(\lambda)$ distribution to model the data, with λ being the unknown "kill rate."

A. One or more of the following problems *might* be graded.

1. Estimate the kill rate using the method of Maximum Likelihood.
2. Estimate the standard error of the estimator in question 1 using Maximum Likelihood asymptotics.
3. Estimate the standard error of the estimator in question 1 using the Bootstrap.
4. Estimate the probability of at least one kill using the method of Maximum Likelihood.
5. Estimate the standard error of the estimator in question 4 using the delta method.
6. Estimate the standard error of the estimator in question 4 using the Bootstrap.

B. The following problem *will* be graded.

7. Compute Bayes estimate of the probability of at least one kill. Take the prior distribution to be $\mathcal{G}am(\alpha_0, \beta_0)$, with $\beta_0 = 1.1$ and α_0 chosen so that the prior mean of λ is 0.25. Provide also a 95% Credible Interval for the probability of at least one kill.
8. What would have been your answer to question 1 be, had the data consisted of 38 zeros? Compare with the Bayesian answer and comment.