Heather
Erika Baylor
Mercy
Chloe

In-Class Assignment: Likelihood

Q1:

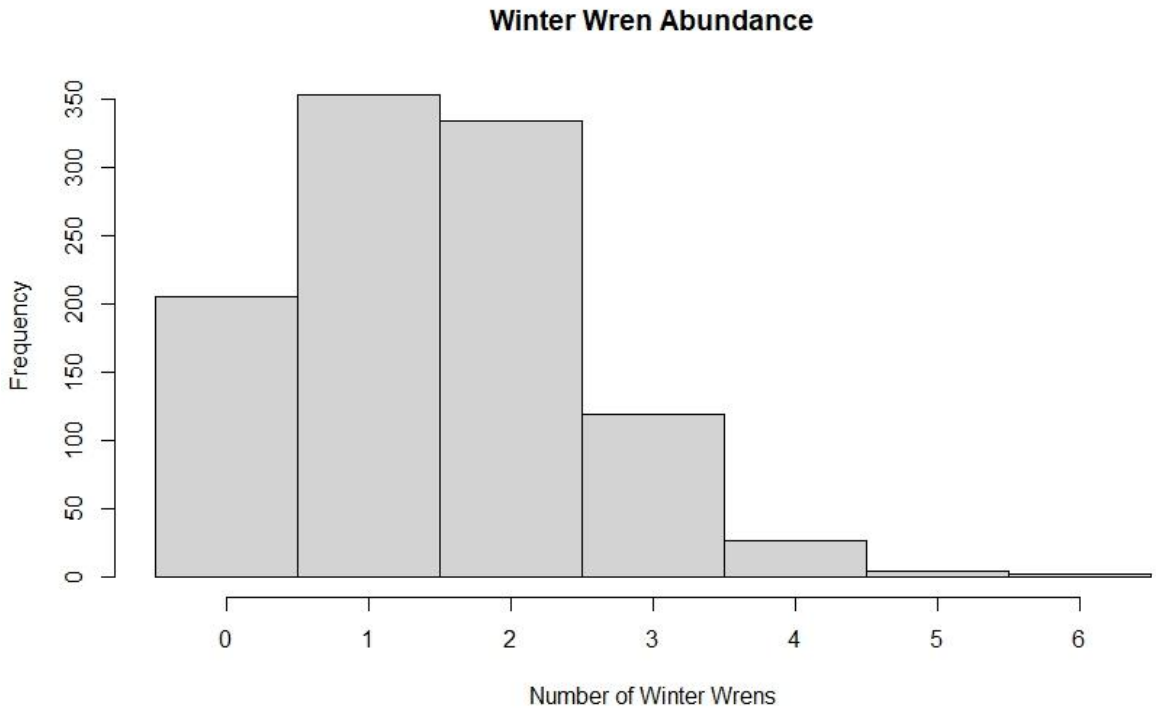
What value for λ did you select?

How did you choose a value?

The value we selected for lambda was 4.0. We used the sum of log-likelihoods to determine the value we should use. We determined that the ultimate “goal” was to reach zero. After experimenting with different values, we found that 4.0 got the value as close to zero as we could find.

Q2:

Include your histogram into your report.



What value for λ did you select?

The lambda value we selected was 1.5.

Show the R code you used to calculate the Poisson log-likelihood for the vector of Winter Wren census counts.

```
hist(dat_all$WIWR, breaks = 0:7 - .5)
```

sum(log(dpois(x = dat_all$WIWR, lambda = 1.5)))

The lambda value we selected was 1.5.

Q3:
What are the two parameters for a binomial distribution and what do they represent?

The two parameters for a binomial distribution are sample size and probability. The sample size is the number of participants or individuals meant to represent the population. The probability is indicating the chances of a particular event or outcome occurring.

What were the parameter values you selected?

The two parameters for a binomial distribution that we selected were 6 for the size and 0.95 for the probability.

How did you choose a value for n?

We calculated the maximum value in our winter wren counts and found that value to be 6. We used that value as it provided a simple indicator of the range of our dataset as our data spanned from 0 (no winter wrens seen) to that maximum value of 6.

Show R code you used to calculate the binomial log-likelihood for the vector of Winter Wren census counts.

sum(log(dbinom(x = wiwr_counts, size = 6, prob = 0.95)))

Q4:

Considering a Maximum Likelihood criterion, which model better fit the data?

Using the sum of log likelihoods, the binomial model seems to fit that data better. Under the binomial model our sum of log likelihoods was -9.685, and under the Poisson model our sum of log likelihoods was -1519.111.

Considering what you know about the Binomial and Poisson distributions, which model is more appropriate for census count data?

The model that would be more appropriate for census count data would be the Poisson distribution. This is because binomial distribution is typically used when observing data that has a possibility of one of two outcomes (such as presence or absence), whereas poisson distribution does not have that limitation and therefore would be a better fit.

What was most difficult about this assignment:
One thing we found difficult was knowing or figuring out what number to use for Lamba in the Poisson log-likelihood model.
Switching from understanding the concept of the binomial and Poisson distributions to actually using them in real-life situations was difficult for us, but we were able to work through it together using our knowledge of each distribution and previous applications of those distributions in lab and other assignments.