In Class Likelihoods

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Question 1

```
> # Question 1
> wiwa_counts = c(2, 6)
> dpois(x = wiwa_counts, lambda = 4.5)
[1] 0.1124786 0.1281201
> sum(log(dpois(x = wiwa_counts, lambda = 4.5)))
[1] -4.239779
> sum(log(dpois(x = wiwa_counts, lambda = 4)))
[1] -4.182044
> sum(log(dpois(x = wiwa_counts, lambda = 5)))
[1] -4.396895
> sum(log(dpois(x = wiwa_counts, lambda = 1)))
[1] -9.272398
> sum(log(dpois(x = wiwa_counts, lambda = 3)))
[1] -4.4835
> sum(log(dpois(x = wiwa_counts, lambda = 3.9)))
[1] -4.184586
> sum(log(dpois(x = wiwa_counts, lambda = 4.1)))
[1] -4.184503
```

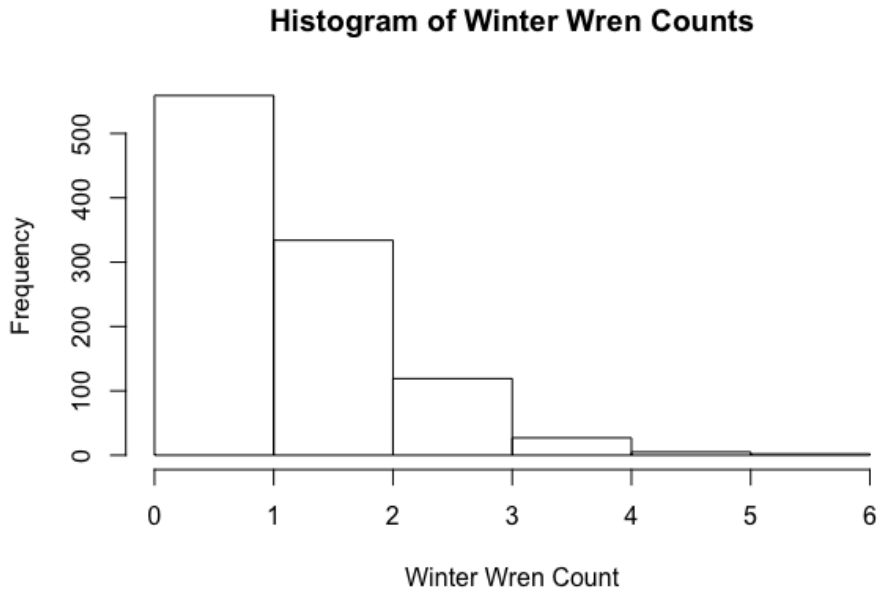
A lambda of 4 produced the least negative value. We worked our way through different values of lambda, trying to produce the least negative value.

Question 2

```
> sum(log(dpois(x = dat_all$WIWR, lambda = 1.0)))
[1] -1613.634
> sum(log(dpois(x = dat_all$WIWR, lambda = 2.0)))
[1] -1603.971
> sum(log(dpois(x = dat_all$WIWR, lambda = 0.5)))
[1] -2146.297
> sum(log(dpois(x = dat_all$WIWR, lambda = 3.0)))
[1] -2032.447
> sum(log(dpois(x = dat_all$WIWR, lambda = 2.5)))
[1] -1787.123
> sum(log(dpois(x = dat_all$WIWR, lambda = 2.1)))
[1] -1634.263
> sum(log(dpois(x = dat_all$WIWR, lambda = 1.5)))
[1] -1519.111
```

> sum(log(dpois(x = dat_all$WIWR, lambda = 1.4)))
[1] -1519.587
> sum(log(dpois(x = dat_all$WIWR, lambda = 1.6)))
[1] -1525.418

A lambda of 1.5 produced the least negative value.



Question 3

The two parameters of the binomial distribution are the n, the number of trials, and the p, the probability of success on each trial.

This was difficult because we are unsure of how to pick the parameter values with very little information about the system. Specifically, the probability is dependent on the number of trials, so both parameters are adjustable depending on the system. But then you said that any value of n should work and we could set it to a value that was larger than the predicted number of birds observed... so we do not get it.

We ended up with this code based on the summary() function in R when looking at the actual data from the Winter Wrens.

summary(dat_all$WIWR)

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
0.000	1.000	1.000	1.456	2.000	6.000

sum(log(dbinom(x = dat_all$WIWR, size = 6, prob = 0.24))) = -1502.348

The size = 6 was the max observed

The prob = mean 1.456 / max 6

And this value gave us the smallest sum of the log likelihoods.