1. (43 total points) Does drinking beer make you more or less attractive to mosquitos? An experiment was performed by Lefevre et al. (PLoS ONE, 2010) to help answer this question. A group of 50 mosquitoes was put at one end of a pipe. Outside of the other end, a human subject, who had recently ingested beer or water, was seated. This subject was seated close enough so that odor from the individual would be detectable by the mosquitoes (note that the mosquitoes could not actually touch the humans). The number of mosquitoes that flew toward the subject over a particular time period were recorded. This experiment was repeated a total of 43 times, each with separate mosquitoes and human subjects. Below is part of the data collected:

> set1 <- read.csv(file = "mosquitoes.csv")

> head(set1)

Count Total Beer

1 27 50 1

2 20 50 1

3 21 50 1

4 26 50 1

5 27 50 1

6 31 50 1

> tail(set1)

Count Total Beer

38 13 50 0

39 22 50 0

40 20 50 0

41 24 50 0

42 18 50 0

43 20 50 0

The variables are:

* Count – Number of mosquitoes that flew toward the human subject
* Total – Total number of mosquitoes in a group
* Beer – Equal to 1 for beer ingested and equal to 0 for water ingested

The full data set is available in the mosquitoes.csv file on the graded materials web page on my course website. Using this data set, complete the following:

* 1. (7 points) Estimate and state the logistic regression model for the probability a mosquito will fly toward the human subject. Use the Beer variable as the only explanatory variable and remember to account for the number of trials when estimating the model.
  2. (8 points) Estimate and state the odds ratio for the Beer variable. Interpret the odds ratio.
  3. (12 points) Estimate and state the probability a mosquito will fly toward a human subject who had consumed water. Provide the corresponding 95% profile likelihood ratio confidence interval as well.
  4. (16 points) Does drinking beer make humans more or less attractive to mosquitos? Use two separate inference methods to answer this question (there are actually more than two, but only use two here). Control the type I error rate at a level of α = 0.05 for each inference method.