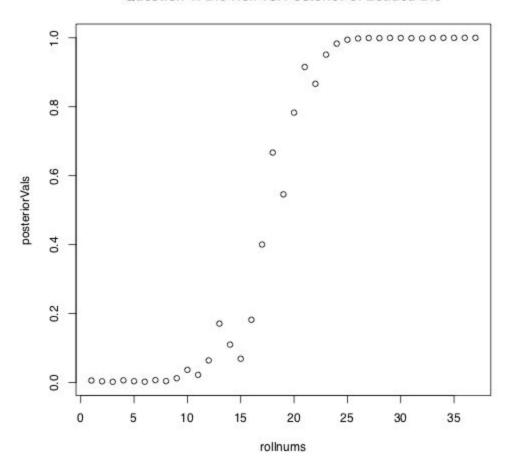
1.) Using the die rolls given, the following graph of posterior probabilities can be obtained using the Bayesian update rule



Question 1: Die Roll vs. Posterior of Loaded Die

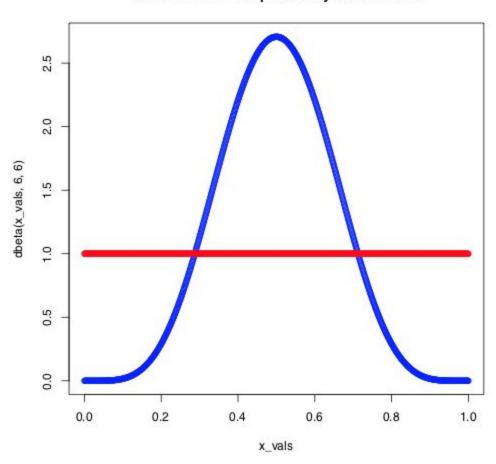
2.) Below is a graph of the estimated power that we are 99.99% confident that we are rolling a loaded die. The graph reaches 0.95 somewhere around 80-90 rolls.

1.0 8.0 9.0 estimatedpower 4.0 0.2 ammana 600° 0.0 numtests

Question 2: Estimated Power vs. Number of Rolls

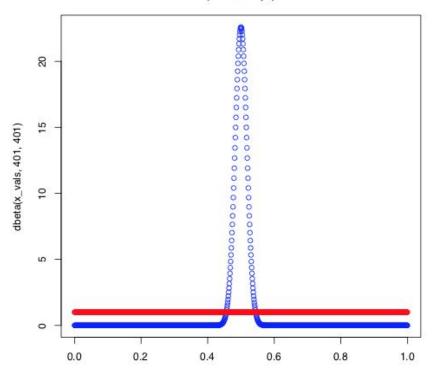
3A.) The red line represents the beta distribution with 0 rolls (i.e. the uniform distribution). The blue line is the beta distribution with 5 heads and 5 tails.

Question 3A: Prior probability distributions

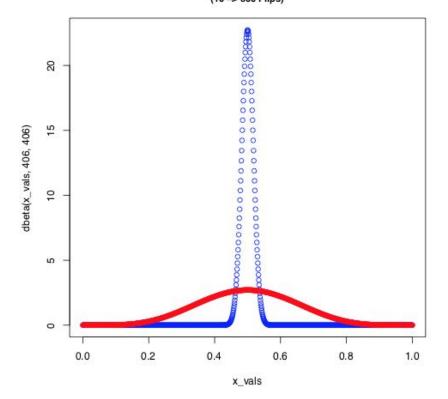


3B.) The graphs below show the change in the beta distribution when we add 800 rolls. These graphs are both approaching a very high confidence of the probability of rolling a

Question 3B: Prior probability distributions vs. Posterior probability distributions (2 -> 802 Flips)



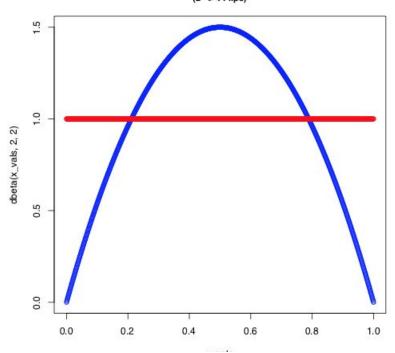
Question 3B: Prior probability distributions vs. Posterior probability distributions (10 -> 800 Flips)



heads (and inferentially a tails). This is due to the "law of large numbers", where the distribution will approach an infinitely tall and slender peak around the true probability as the number of samples increases.

These two graphs showing the addition of only two rolls look completely different because we are not updating them with enough data to establish a higher level of confidence (a smaller width).

Question 3B: Prior probability distributions vs. Posterior probability distributions (2 -> 4 Flips)



Question 3B: Prior probability distributions vs. Posterior probability distributions (10 -> 12 Flips)

