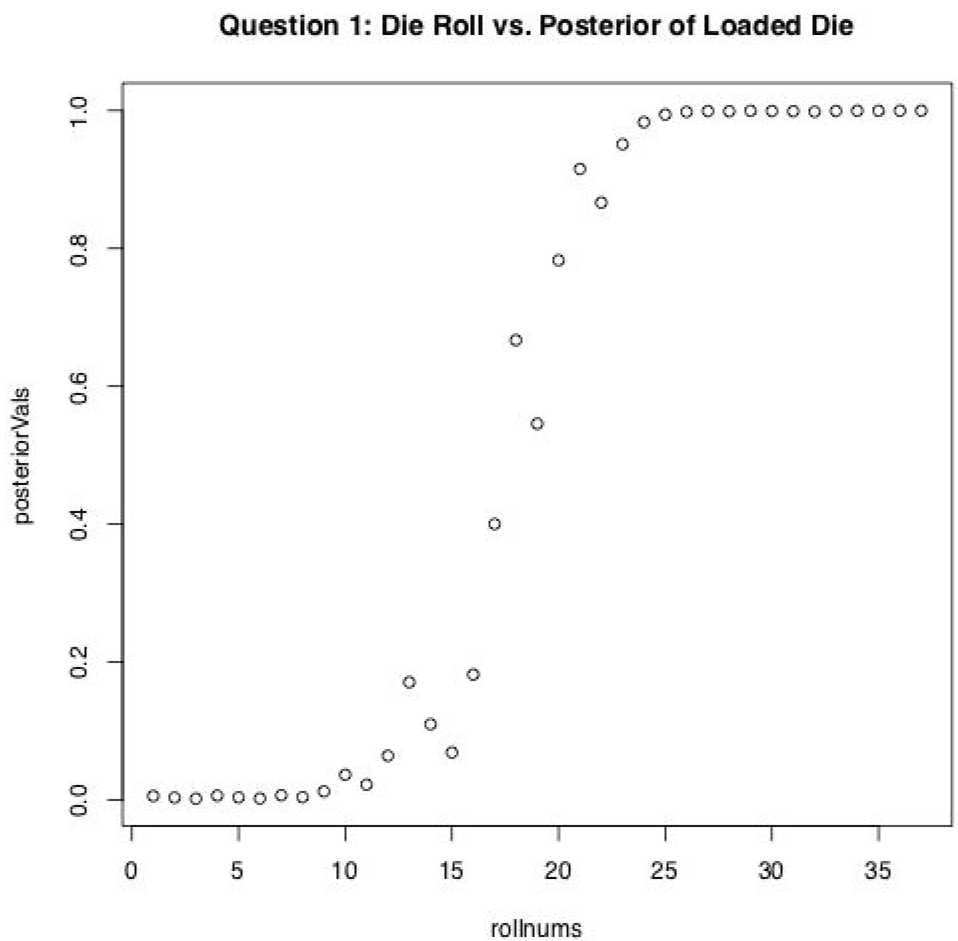
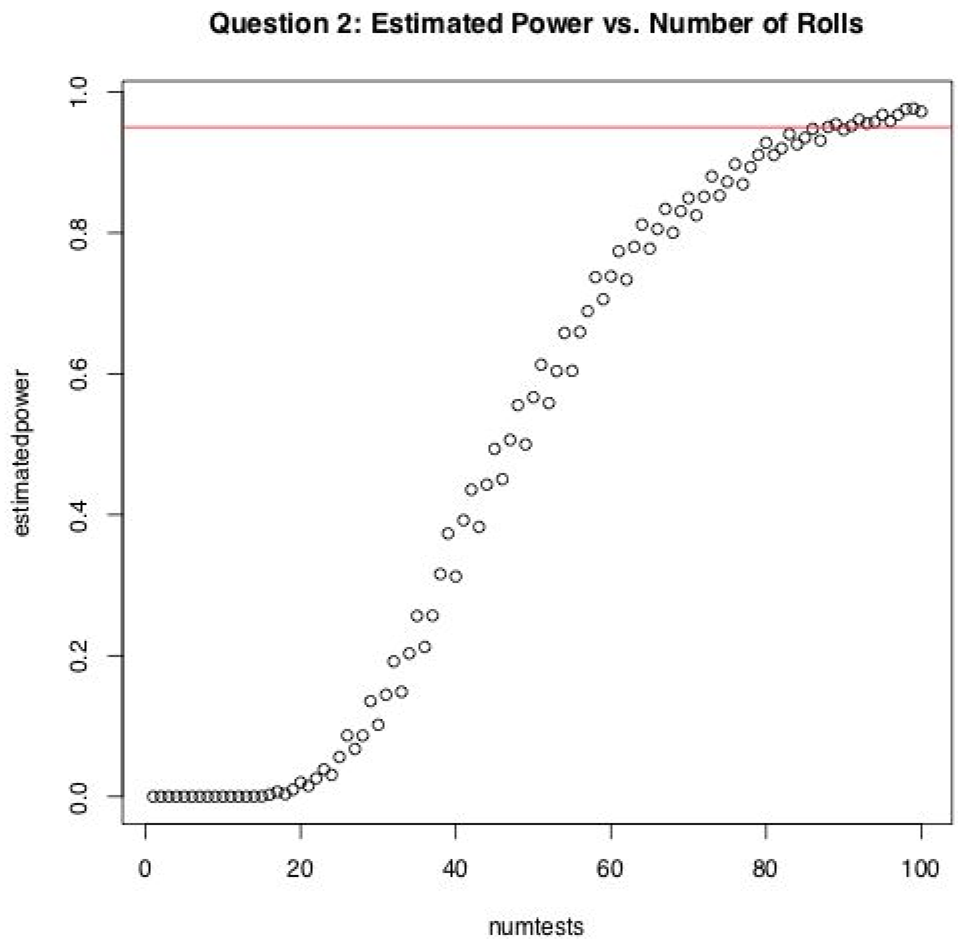
Connor Frasier: Advanced Stats Lab 04

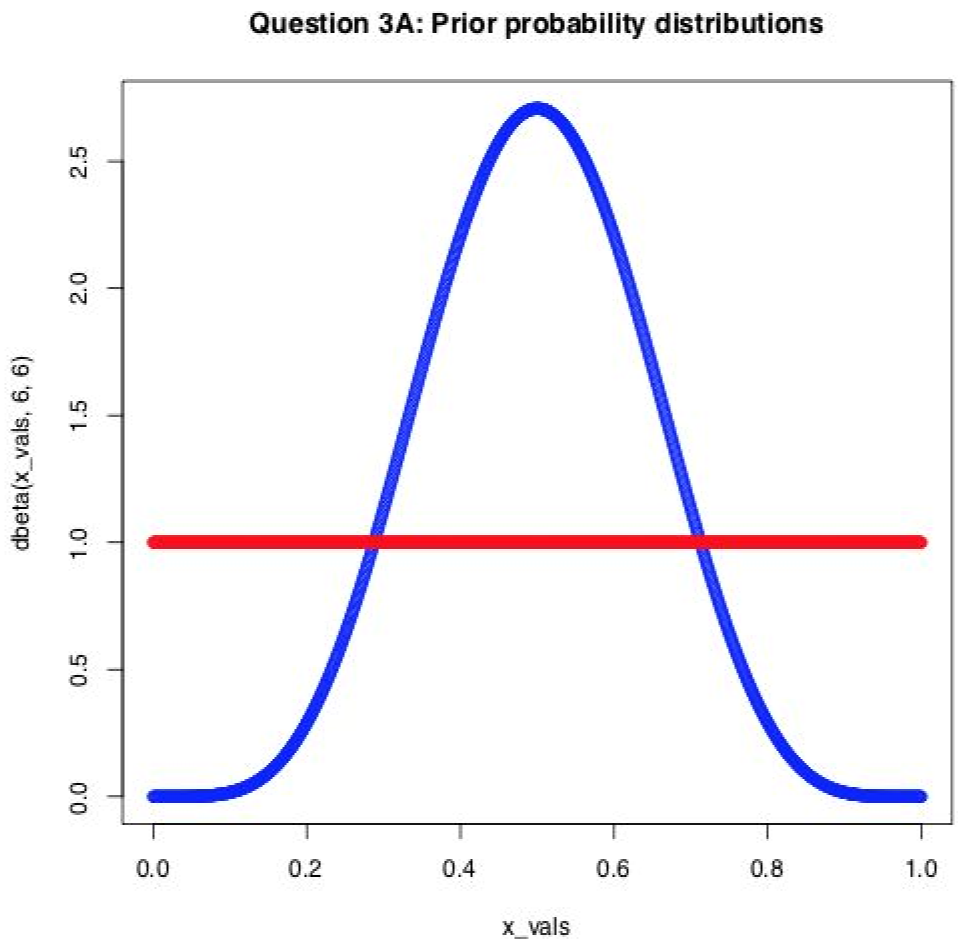
1.) Using the die rolls given, the following graph of posterior probabilities can be obtained using the Bayesian update rule



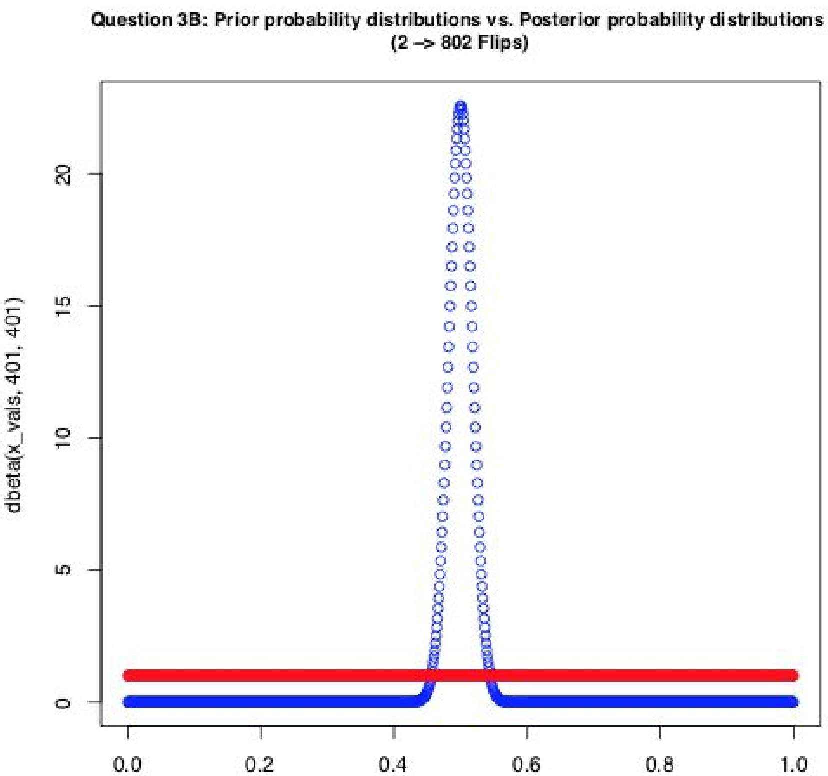
2.) Below is a graph of the estimated power that we are 99.99% confident that we are rolling a loaded die. The graph reaches 0.95 somewhere around 80-90 rolls.

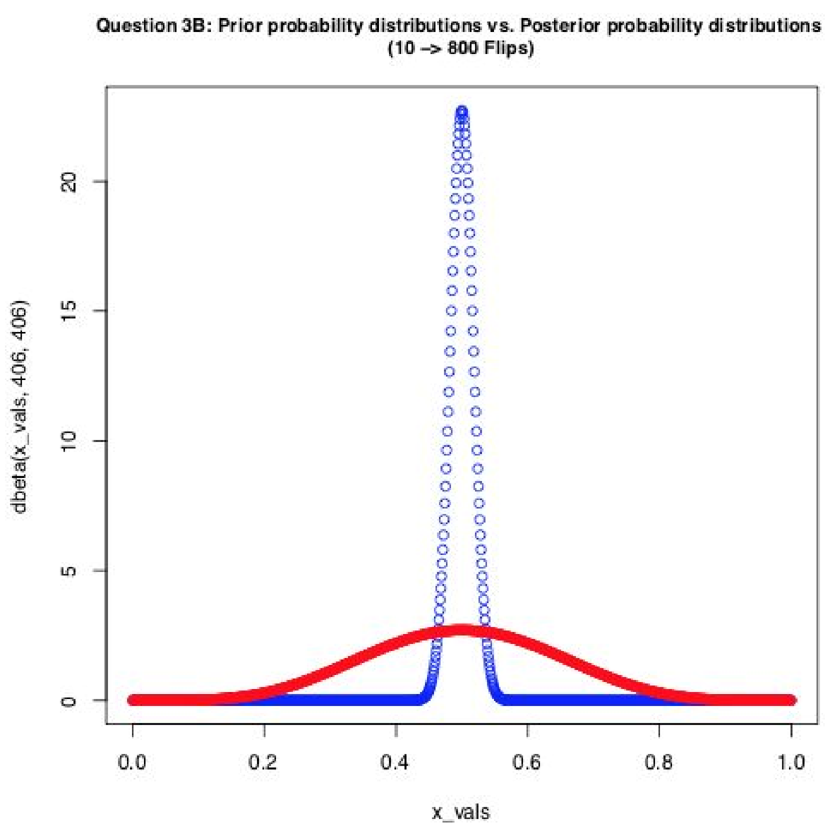


3A.) The red line represents the beta distribution with 0 rolls (i.e. the uniform distribution). The blue line is the beta distribution with 5 heads and 5 tails.



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 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).