(1) You walk into the “occasionally dishonest casino” with prior probabilities and likelihoods set to the values in slides 24-25 of lecture #4.

You pick up one die and with it roll:

2 3 2 6 3 5 6 2 6 6 2 6 6 2 3 6 6 6 5 6 6 5 6 6 6 6 6 4 6 3 3 3 6 6 5 6 6

Make a graph of the posterior probability that you have picked up a loaded die as a function of the number of times you have rolled the die.

Show your code…

You can represent the rolls as

data<-c(2,3,2,6,3,5,6,2,6,6,2,6,6,2,3,6,6,6,5,6,6,5,6,6,6,6,6,4,6,3,3,3,6,6,5,6,6)

(2) How many times on average would you need to roll a loaded die to be 99.99% sure that it was loaded at least 95% of the time? (Show your work)

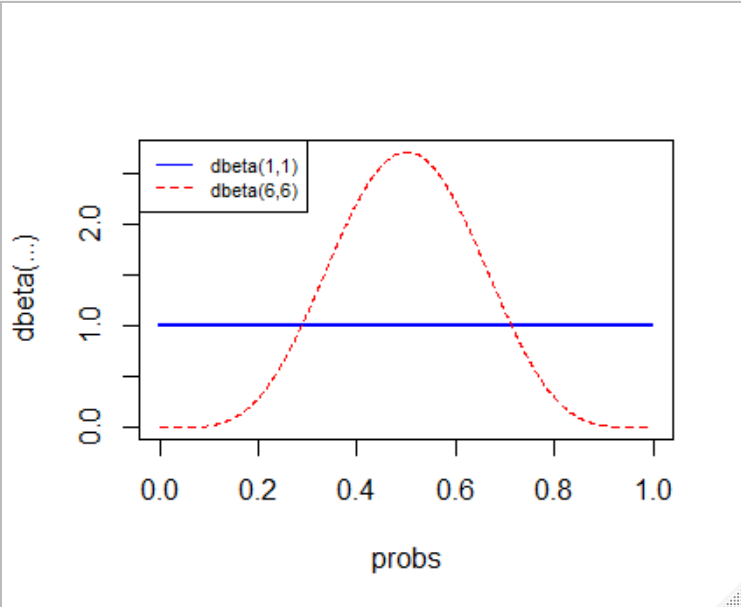
(3) Consider two priors for our belief about p(heads) for a coin:

A uniform prior (for example dbeta(1,1)).

A prior of 5 heads and tails (dbeta(6,6)).

**(3A) superimpose visualizations of these two priors (using different colors for each prior) ranging from 0 to 1.**

**See figure 1.**



**Figure 1:** R command - plot2beta(c(1,1), c(6,6))

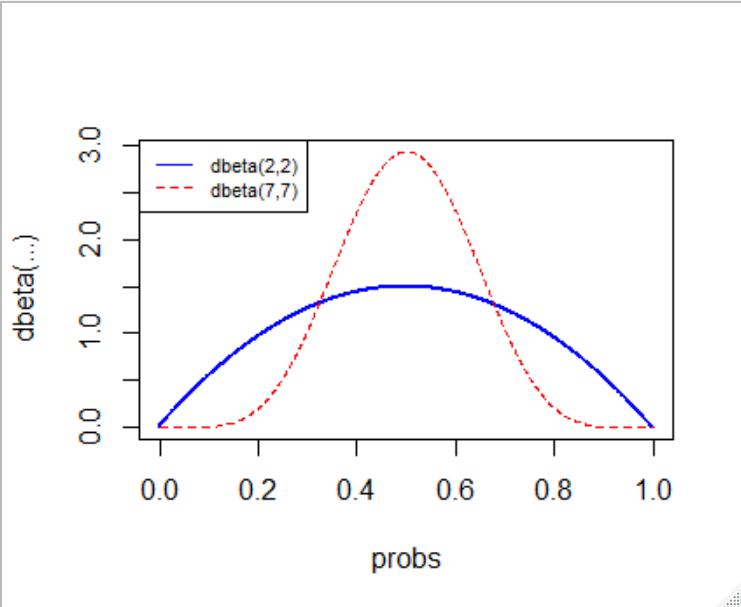
(3B) Make posterior graphs for two experiments with new data:

One with 1 heads and 1 tail as additional observations.

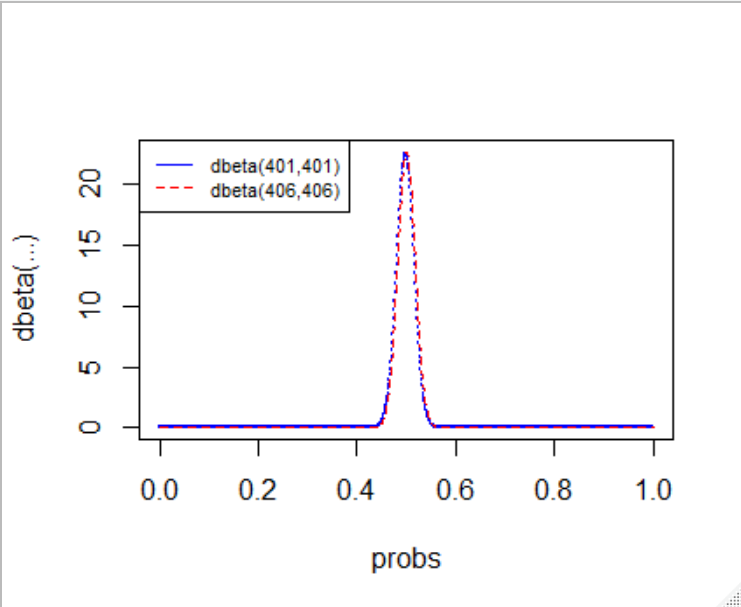
One with 400 heads and 400 tails as additional observations.

So you should end up with 4 posterior plots: (2 datasets \* 2 priors).

Plot the two distributions involving the 2 new coin flips on one graph and the two distributions involving the 800 new coin flips on a separate graph.



**Figure 2:** Posterior plots for two additional coin flips (1 head & 1 tail). R command - plot2beta(c(1+1,1+1), c(6+1,6+1)) and function source file.



Why are the two posterior plots involving the 800 coin flips so similar?

Why are the two posterior plots involving the 2 coin flips so different?