

1. Consider a very, very large bag of coins, each with different probability of landing heads. Suppose we draw a coin at random, and let Y be the heads probability for the selected coin. We will model the distribution of Y using $\text{Beta}(1/2, 1/2)$ distribution.
 - (a) Make a quick sketch of the density function of Y . Give a brief explanation about what this suggests about the distribution of coins.
 - (b) What is the average value of Y , before you know the results of any coin flips?
 - (c) Suppose you flip the coin 3 times, obtaining 2 heads and 1 tails. Show directly using Bayes Rule and LoTP that the posterior distribution of Y , given this information, is $\text{Beta}(5/2, 3/2)$.
 - (d) Make a brief sketch of $\text{Beta}(5/2, 3/2)$. What does this now suggest about the distribution of Y ?
 - (e) What is the mean value of Y , given that the coin flipped 2 heads and 2 tails?