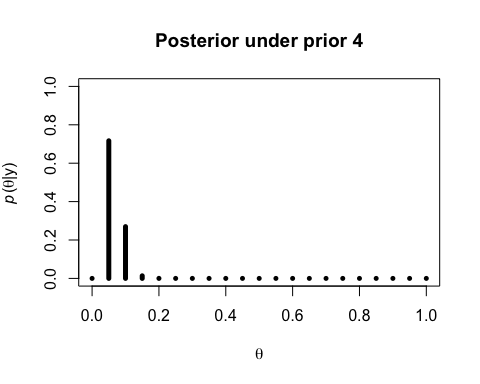
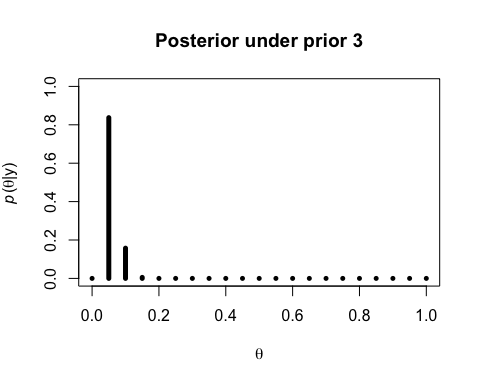
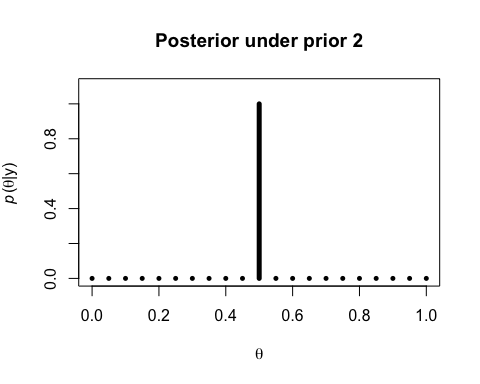
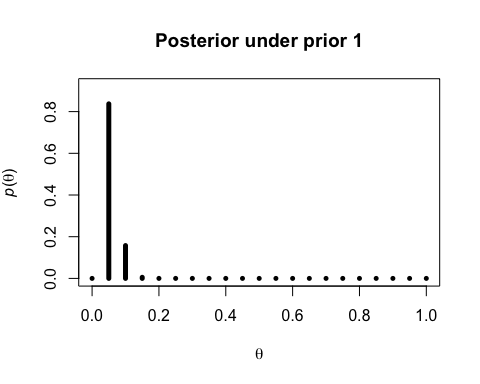
Homework 1

Casey Gibson

### Problem 1

If we denote then

### Problem 2

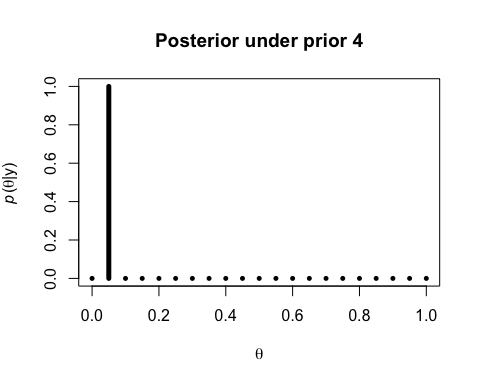
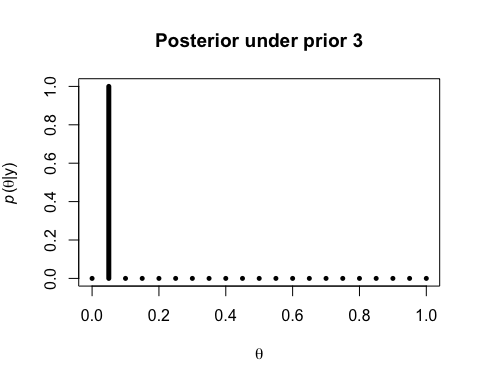
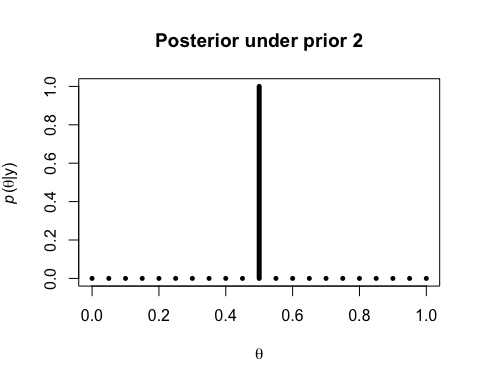
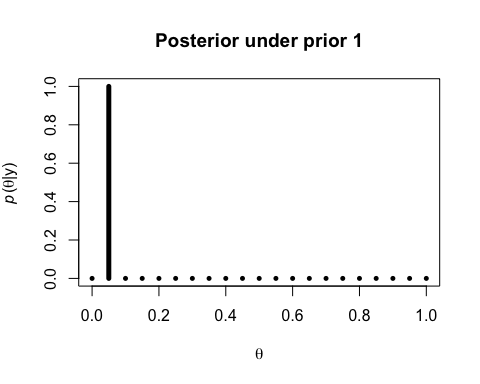


|  |  |  |  |
| --- | --- | --- | --- |
| Expected Value Prior 1 | Expected Value Prior 2 | Expected Value Prior 3 | Expected Value Prior 4 |
| 0.0584 | 0.5 | 0.0584 | 0.0649 |

#### Results

Prior clearly pulls the posterior towards the right because it forces all less than to have probability. Prior yeilds essentially the same results as prior , which makes sense because the likelihood is so skewed towards the range , so excluding does not change the posterior much. Prior pushes the posterior slightly upwards, which again makes sense because the prior assigns higher probabilities to higher values of theta, pushing the posterior to the right.

### Problem 3



|  |  |  |  |
| --- | --- | --- | --- |
| Expected Value Prior 1 | Expected Value Prior 2 | Expected Value Prior 3 | Expected Value Prior 4 |
| 0.05 | 0.5 | 0.05 | 0.05 |

#### Results

All the priors become much more concentrated around the maximum likelihood estimate of .

As we get more data the effect of the prior diminishes (which is called "swamping" I think?). This makes more sense, to me at least, if we consider the log posterior.

taking logs we see

where is the likelihood function.

This becomes

Now we can clearly see, as increases the effect of the dimishes since the sum term contributes more than the prior. It is harder for me to see this clearly in the non-log space because we are dealing with multiplication of small numbers.