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1 Question 1

Binomial likelihood, the posterior with a conjugate beta prior is:

$$p(\theta|y) = \frac{1}{B(\bar{\alpha}, \bar{\beta})} \theta^{\bar{\alpha}-1} (1-\theta)^{\bar{\beta}-1} \quad (1)$$

with

$$\begin{aligned} \bar{\alpha} &= \alpha_0 + y \\ \bar{\beta} &= \beta_0 + n - y \end{aligned} \quad (2)$$

The beta prior can be specified as:

$$\equiv \text{binomial experiment with } (\alpha_0 - 1) \text{ successes in } (\alpha_0 + \beta_0 - 2) \quad (3)$$

2 Question 2

Check PPD for binomial likelihood on p. 151. We should take into account sampling variability of $\hat{\theta}$

3 Question 3

Contour probability: posterior evidence of H_0 with HPD interval. Defined as:

$$P[p(\theta|\mathbf{y}) > p(\theta_0|\mathbf{y})] \equiv (1 - p_B) \quad (4)$$

p_B is computed from the smallest HPD interval containing θ_0 .