

Q74***: Changepoint

Suppose we observe the following dataset $x_t \in 0, 1$ for $t = 1 \dots 50$

0 0 1 0 0 1 0 0 0 0 1 0 0 0 0 1 0 0 1 0 1 1 0 0 1 1 1 1 1 1 1 1 1 1 0 1 1 0 1 1 1 1 1 1 1 1 1 1

1. Suppose we know that the data comes from the following model

$$\begin{aligned}\pi_1 &\sim \mathcal{B}(1, 1) \\ \pi_2 &\sim \mathcal{B}(1, 1) \\ x_t &\sim \begin{cases} \mathcal{BE}(x_t; \pi_1), & t \leq n \\ \mathcal{BE}(x_t; \pi_2), & t > n \end{cases}\end{aligned}$$

2. Derive, compute and plot the posterior probability of $p(n|x_{1:50})$ given that n is *a-priori* uniform.