Let x be a categorical variable which takes values in $\{0, \ldots, n\}$ and y be a continuous variable such that $y \in (0, 1)$. Let the joint density of (x, y) is

$$f(x, y) = \frac{1}{\text{Beta}(\alpha, \beta)} \binom{n}{x} y^{x+\alpha-1}(1-y)^{n-x+\beta-1}$$

For $n = 10, \alpha = 2$ and $\beta = 3$, generate samples of (x, y) using two procedures: 1) Full conditional Gibbs and 2) an MH-within-Gibbs procedure, where sample x directly from the full conditional and y using random-walk MH.