**Algorithm 1** 2D Gibbs Sampler with Systematic Scan

**Require:** Target conditionals $\pi(x|y)$ and $\pi(y|x)$, number of iterations $N$, initial values $(x^{(0)}, y^{(0)})$

**Ensure:** Sequence of samples $\{(x^{(t)}, y^{(t)})\}_{t=1}^{N}$

Initialize $t \leftarrow 0$
Set starting values $(x^{(0)}, y^{(0)})$
**for** $t = 1$ to $N$ **do**
    Sample $x^{(t)} \sim \pi(x|y^{(t-1)})$
    Sample $y^{(t)} \sim \pi(y|x^{(t)})$
    Store $(x^{(t)}, y^{(t)})$
**end for**
**return** $\{(x^{(t)}, y^{(t)})\}_{t=1}^{N}$