Algorithm 8.4 *Gibbs sampling for mixtures.*

1. Take some initial values $\theta^{(0)} = (\mu_1^{(0)}, \mu_2^{(0)})$.

2. Repeat for $t = 1, 2, \ldots, .$

   (a) For $i = 1, 2, \ldots, N$ generate $\Delta_i^{(t)} \in \{0, 1\}$ with $\Pr(\Delta_i^{(t)} = 1) = \hat{\gamma}_i(\theta^{(t)})$, from equation (8.42).

   (b) Set

$$\begin{aligned} \hat{\mu}_1 &= \frac{\sum_{i=1}^N (1 - \Delta_i^{(t)}) \cdot y_i}{\sum_{i=1}^N (1 - \Delta_i^{(t)})}, \\ \hat{\mu}_2 &= \frac{\sum_{i=1}^N \Delta_i^{(t)} \cdot y_i}{\sum_{i=1}^N \Delta_i^{(t)}}, \end{aligned}$$

   and generate $\mu_1^{(t)} \sim N(\hat{\mu}_1, \hat{\sigma}_1^2)$ and $\mu_2^{(t)} \sim N(\hat{\mu}_2, \hat{\sigma}_2^2)$.

3. Continue step 2 until the joint distribution of $(\boldsymbol{\Delta}^{(t)}, \mu_1^{(t)}, \mu_2^{(t)})$ doesn't change