

1 Posterior is: $f(\mu, \sigma^2, \log \vec{\theta} | Y)$

$$\begin{aligned}
 f(\mu, \sigma^2, \log \vec{\theta} | Y) &\propto f(Y | \log \vec{\theta}) * f(\log \vec{\theta} | \mu, \sigma^2) * f(\mu, \sigma^2) \\
 &= \prod_{j=1}^J \left[\left(\prod_{i=1}^N e^{-w_j e^{\log \theta_j}} \left(w_j e^{\log \theta_j} \right)^{k_{ji}} \right) * \frac{1}{\sigma} e^{\frac{-(\log \theta_j - \mu)^2}{2\sigma^2}} * \frac{1}{\sigma^2} \right]
 \end{aligned}$$