$$p(x^{(i)} \mid y=c) = \prod_{k=1}^{n} \theta_{ck}^{x_k^{(i)}}$$

$$p(X \mid \theta, y=c) = \prod_{i=1}^{m} \prod_{k=1}^{n} \theta_{ck}^{x_k^{(i)}}$$

$$p(X \mid \theta, y=c) = \prod_{k=1}^{n} \theta_{ck}^{\sum_{i=1}^{m} x_k^{(i)}}$$

$$\log P = \sum_{k=1}^{n} \log \theta_{ck}^{\sum_{i=1}^{m} x_k^{(i)}} - \lambda \sum_{k=1}^{n} \theta_{ck}$$

$$\frac{\partial \log P}{\partial \theta_{ck}} = \frac{\sum_{i=1}^{m} x_k^{(i)}}{\theta_{ck}} - \lambda = 0$$

$$\Leftrightarrow \theta_{ck} = \sum_{i=1}^{m} \frac{x_k^{(i)}}{\lambda}$$

$$\log P(\lambda) = \sum_{k=1}^{n} \log\left(\sum_{i=1}^{m} \frac{x_k^{(i)}}{\lambda}\right) - \lambda \sum_{k=1}^{n} \sum_{i=1}^{m} \frac{x_k^{(i)}}{\lambda}$$

$$= \sum_{k=1}^{m} \left(\log \frac{1}{\lambda} + \log \sum_{i=1}^{m} x_k^{(i)}\right) - \lambda \sum_{k=1}^{n} \sum$$

$$\frac{\partial \log P(\lambda)}{\partial \lambda} = -\frac{\sum_{k=1}^{m}}{\lambda} - 1 = 0 \Leftrightarrow \lambda = m$$