$$= \frac{1}{N} \sum_{i=1}^{N} \log\left(P(y^{(i)} \mid x^{(i)}, \theta)\right)$$

$$= \frac{1}{N} \sum_{i=1}^{N} \log\left(\frac{P(x^{(i)} \mid y^{(i)}, \theta) P(y^{(i)})}{P(x^{(i)})}\right)$$

$$= \frac{1}{N} \sum_{i=1}^{N} \log\left(\frac{P(x^{(i)} \mid y^{(i)}, \theta) P(y^{(i)})}{\sum_{k=1}^{K} P(x^{(i)} \mid y=k, \theta) P(y=k)}\right)$$

$$= \frac{1}{N} \sum_{i=1}^{N} \log\left(P(x^{(i)} \mid y^{(i)}, \theta) + \log\left(\frac{1}{10}\right) - \log\left(\frac{1}{10} \times \sum_{k=1}^{K} P(x^{(i)} \mid y=k, \theta)\right)\right)$$

Derivation