

$$\begin{aligned}
L(\theta) &= \log P(y|\theta) = \log \sum P(z|\theta)P(y|z, \theta) \\
&= \log \sum_z Q(z) \frac{P(z|\theta)P(y|z, \theta)}{Q(z)} \\
&\geq \sum_z Q(z) \log \frac{P(z|\theta)P(y|z, \theta)}{Q(z)}
\end{aligned}$$

where the equation holds if $\frac{P(z|\theta)P(y|z, \theta)}{Q(z)} = c$,

and $\sum_z Q(z) = 1$, so

$$Q(z) = \frac{P(z|\theta)P(y|z, \theta)}{\sum_z P(z|\theta)P(y|z, \theta)} = P(z|y, \theta)$$