$$J(w) = -\frac{1}{m} \sum_{i=1}^{m} \log P_{w}(y^{(i)} | z^{(i)})$$

$$= \frac{1}{m} \sum_{i=1}^{m} L(w, z^{(i)}, y^{(i)})$$

$$= \frac{1}{m} \sum_{i=1}^{m} L(w, z^{(i)}, y^{(i)})$$

where
$$L(w, x, y) = -\log P_w(y|x)$$