

$$\begin{aligned}
\log p(q|d) &= \sum_{w \in q} \log \frac{tf_{w,d} + \mu \frac{cf_w}{\sum_w cf_w}}{|d| + \mu} \\
&= \log \frac{15 + 2,000 \times (160,000/10^9)}{1,800 + 2,000} \\
&\quad + \log \frac{25 + 2,000 \times (2,400/10^9)}{1,800 + 2,000} \\
&= \log(15.32/3,800) + \log(25.005/3,800) \\
&= -5.51 + -5.02 \\
&= -10.53
\end{aligned}$$