

$$\sum_k q_k \log \left(1 + \frac{1-\alpha}{\alpha} \cdot \frac{f_{k,d}}{\lambda_d} \cdot \frac{\lambda_c}{\lambda_k} \right)$$

$$= \log \left(1 + \frac{1-0.5}{0.5} \cdot \frac{3}{4000} \cdot \frac{10^7}{600} \right) \\ + \log \left(1 + \frac{1-0.5}{0.5} \cdot \frac{5}{4000} \cdot \frac{10^7}{4000} \right)$$

$$+ \log \left(1 + \frac{1-0.5}{0.5} \cdot \frac{1}{4000} \cdot \frac{10^7}{2000} \right)$$

$$= \log(13.5) + \log(4.125) + \log(2.25)$$

$$= \underline{\underline{4.83}} \quad \leftarrow \text{LMIJM} \quad (\text{Nat. log})$$

$$\textcircled{2} \quad \text{LMD}_1 = \sum_{t \in T} \log \left(1 + \frac{f_{t,d}}{\mu} \cdot \frac{l_c}{l_t} \right) - n \cdot \log \left(1 + \frac{l_d}{\mu} \right)$$

$$= \log \left(1 + \frac{3}{0.5} \cdot \frac{10^7}{600} \right)$$

$$+ \log \left(1 + \frac{5}{0.5} \cdot \frac{10^7}{4000} \right)$$

$$+ \log \left(1 + \frac{1}{0.5} \cdot \frac{10^7}{2000} \right)$$

$$- 3 \cdot \log \left(1 + \frac{4000}{0.5} \right)$$

$$= \log(100,001) + \log(25,001)$$

$$+ \log(10,001) - 3 \cdot \log(8,001)$$

$$= 3.888 = \underline{\underline{3.89}} \leftarrow \text{LMD}_1 \text{ (nat. log)}$$