

$$\log(n!) = \underbrace{\log 1 + \log 2 + \log 3 + \dots + \log n}_{\text{p. 77 p/c } n} \leq \underbrace{\log n + \log n + \dots + \log n}_n = n \log n \in O(n \log n)$$

$$\begin{aligned} \log(n!) &= \log 1 + \log 2 + \dots + \log n \geq \underbrace{\log(n/2) + \log(n/2+1) + \dots + \log n}_{\text{p. 77 p/c } n/2} \\ &\geq \underbrace{\log(n/2) + \log(n/2) + \dots + \log(n/2)}_{\text{p. 77 p/c } n/2} = \frac{n}{2} \cdot \log\left(\frac{n}{2}\right) \\ &\in \Omega(n \log n) \end{aligned}$$