$$\log(n!) = \underbrace{\log 1 + \log 2 + \log 3 + \dots + \log n}_{\text{סה"כ } n} \leq \underbrace{\log n + \log n + \dots + \log n}_{n}$$

$$= n \log n \in O(n \log n)$$

$$\log(n!) = \log 1 + \log 2 + \dots + \log n \geq \underbrace{\log(n/2) + \log(n/2+1) + \dots + \log n}_{\text{סה"כ } n/2}$$

$$\geq \underbrace{\log(n/2) + \log(n/2) + \dots + \log(n/2)}_{\text{סה"כ } n/2} = n/2 \cdot \log(n/2)$$

$$\in \Omega(n \log n)$$