Logs

Submission deadline: February 28th 2022

Find

$$\frac{1}{\log_2(2022!)} + \frac{1}{\log_3(2022!)} + \cdots + \frac{1}{\log_{2022}(2022!)}$$

The problem was solved by

- Muhammed YÜKSEL, *Hacettepe University Automotive Eng-Mech. Eng, Ankara/Turkey*

- Gurkan Koray Akpinar, *Aydin, Turkey.*

- Hari Kishan, *D.N. College, Meerut, India.*

- Rohan Mitra, *American University of Sharjah, UAE.*

- Atakan Erdem, *Middle East Technical University, Ankara, Turkey.*

Discussion;

Since $\dfrac{1}{\log_m(2022!)} = \log_{2022!}(m)$, it is easy to see that the given series is equal to

$$\log_{2022!}(2) + \log_{2022!}(3) + \cdots + \log_{2022!}(2022)$$

The sum above is clearly equal to $\log_{2022!}(2 \cdot 3 \cdots 2022)$, which is equal to 1.