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## Problem of the Month - November 2023

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Show that

$$\left( \prod_{n=0}^{2023} (3n + 1) \right) \left( \sum_{n=0}^{2023} \frac{(-1)^n}{3n + 1} \binom{2023}{n} \right) = 3^{2023} (2023!).$$