Thm. **Theorem 1**. For each $n \in \mathbb{N}$

$$\sum_{i=1}^{n} i\,(i!) \;=\; (n+1)! - 1 \;.$$

▶. Using math induction, prove Theorem 1.

○. Hints.
Recall $n! = 1 \cdot 2 \cdots (n-1) \cdot n = n \cdot (n-1) \cdot (n-2) \cdots 2 \cdot 1$.
So $(n!)\,(n+1) = (1 \cdot 2 \cdots n)\,(n+1) = (n+1)!$.
Don't forget needed parentheses: $(n!)(n+1) \neq (n!)n + 1$.

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