

Convert permutation $\sigma = 3, 4, 1, 2$ to decimal representation

Step 1: Let $i = \arg \min(\sigma)$ $3, 4, \boxed{1}, 2$

Step 2: Count the number of digits to the left of digit i that are greater than $\sigma(i)$. This is the first digit of the factoradic.

$\boxed{3}, \boxed{4}, 1, 2$ **Num digits: 2**

Step 3: Remove $\sigma(i)$ from the permutation. $3, 4, 2$

Step 4: Perform steps 1-3 until no digits remain.

$3, 4, \boxed{1}, 2 \longrightarrow \boxed{3}, \boxed{4}, 1, 2$ **Num digits: 2**

$3, 4, \boxed{2} \longrightarrow \boxed{3}, \boxed{4}, 2$ **Num digits: 2**

$\boxed{3}, 4 \longrightarrow 3, 4$ **Num digits: 0**

$\boxed{4} \longrightarrow 4$ **Num digits: 0**

Step 5: Convert factoradic $2, 2, 0, 0$ to decimal, using the factorial numbers as the place for each digit.

Place:	$3!$	$2!$	$1!$	$0!$
Factoradic:	2	2	0	0

$$2 \times 3! + 2 \times 2! + 0 \times 1! + 0 \times 0! = 16$$

The unique decimal representation of permutation $3, 4, 1, 2$ is **16**.