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CONNECTIONS BETWEEN CERTAIN NUMBERS RELATED TO DERANGEMENTS AND r -PERMUTATIONS

For non-negative integer parameters r, u, m, n define

$$\begin{aligned}\mathcal{D}(r, u, m, n) &:= \{ \sigma \in \mathcal{S}_{r+n} \mid \sigma(x) = y \text{ for exactly } u \text{ pairs } (x, y) \\ &\quad \text{such that } 1 \leq x, y \leq r \text{ and} \\ &\quad \sigma(t) = t \text{ for exactly } m \text{ elements } r+1 \leq t \leq r+n \}, \\ \mathcal{D}_{r,u,m}(n) &:= \{ \sigma \in \mathcal{S}_{r+n} \mid \forall 1 \leq x < y \leq r \text{ } x \text{ and } y \text{ are in disjoint cycles of } \sigma \text{ and} \\ &\quad \sigma(z) = z \text{ for exactly } u \text{ elements } 1 \leq z \leq r, \text{ and} \\ &\quad \sigma(t) = t \text{ for exactly } m \text{ elements } r+1 \leq t \leq r+n \},\end{aligned}$$

where $\mathcal{S}_n$ denotes the set of all the permutations of the set $\{1, \dots, n\}$.

The aim of the talk is to show connections between the sets $\mathcal{D}(r, u, m, n)$, $\mathcal{D}_{r,u,m}(n)$, and the sets of (some classes of) r -derangements.

This is joint work with Błażej Żmija.