

Mal'tsev conditions arising from functional relations

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We call a relation $\mathbf{R} \subseteq A^k$ *functional* if it is the graph of an operation i.e. if its first $k - 1$ coordinates uniquely determine its last. If $\mathcal{V}$ is a variety, the *free functional relation* generated by $\mathbf{R}$ in $\mathcal{V}$ is obtained by factoring out the free relational structure generated by $\mathbf{R}$ with the smallest congruence θ such that $\mathbf{R}/\theta$ is functional.

The free functional relation can be trivial. For a given $\mathbf{R}$, the triviality of the free functional relation generated by $\mathbf{R}$ in $\mathcal{V}$ can be naturally described by a Mal'tsev condition. In this talk, we explore some of these Mal'tsev conditions, and the Galois connection between relations and varieties induced by the triviality of the free functional relation.