# Hom polytopes between regular polytopes

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**Abstract**

Given two polytopes $P \subset \mathbb{R}^m$, $Q \subset \mathbb{R}^n$, the collection of affine maps $f : \mathbb{R}^m \to \mathbb{R}^n$ such that $f(P) \subset Q$ forms a polytope in the vector space of affine maps—the dual space to $\mathbb{R}^{mn+n}$. This polytope is called the hom polytope and denoted $\mathrm{Hom}(P, Q)$; it is the hom set from the object $P$ to the object $Q$ in the category **Pol** of polytopes and affine maps. – This talk will introduce the hom polytope and touch lightly on the categorical structure of **Pol**. The main focus will be on recent progress in uncovering the combinatorial structure of $\mathrm{Hom}(P, Q)$ whenever $P$ and $Q$ are regular polytopes in high dimension.

**Keywords:** polytope, affine map.