Polytopes

$$\mathcal{P} = \left\{ \sum_{i=1}^{|V|} \lambda_i v_i \in \mathbb{R}^k \;\middle|\; \sum_{i=1}^{|V|} \lambda_i = 1,\ \lambda_i \geq 0,\ v_i \in \mathbb{R}^2 \right\}$$

$$V = \left\{ (0,0), \left(\tfrac{1}{2},0\right), \left(\tfrac{1}{2},\tfrac{1}{4}\right), \left(0,\tfrac{1}{3}\right) \right\} \subseteq \mathbb{R}^2$$

$$\lambda = \left(\tfrac{1}{4}, 0, \tfrac{1}{2}, \tfrac{1}{4} \right)$$

$$v = \tfrac{1}{4}(0,0) + 0\left(\tfrac{1}{2},0\right) + \tfrac{1}{2}\left(\tfrac{1}{2},\tfrac{1}{4}\right) + \tfrac{1}{4}\left(0,\tfrac{1}{3}\right) = \left(\tfrac{1}{4}, \tfrac{1}{8}+\tfrac{1}{12}\right)$$