

## TECHNISCHE UNIVERSITÄT MÜNCHEN Zentrum Mathematik



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## Discrete Geometry: Lattice Polytopes (winter 2014/15)

- Problem Set 14 (January 27, 2016) -

**Problem 1.** The toric variety  $V = V(xy - zw) \subset \mathbb{C}^4$ .

Consider the affine variety that is defined by the polynomial f(x, y, z, w) := xy - zw.

- i) Identify a 3-dimensional algebraic torus as subset of V.
- ii) Which Laurent monomials extend to functions of V? Describe the lattice points  $(a, b, c) \in \mathbb{Z}^3$  such that a Laurent monomial  $t_1^a \cdot t_2^b \cdot t_3^c$  extends to a function on V. iii) Describe the cone  $C \subset \mathbb{R}^3$  that contains the exponents of the Laurent mononials that extend to V in
- terms of primitive  $\mathbb{Z}^3$ -vectors that generate C.