



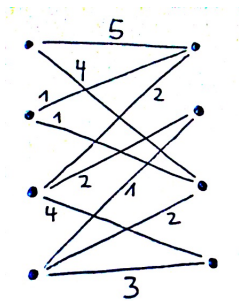
POLYMAKE QUIZ

Once you will have answered the questions, you will get a string of numbers. This is a password. Download the second file in the "quiz" section on the website, and do

gpg -d message.txt.gpg

to check you answer. Once you figured out the hidden message, please send it to belotti@math.tu-berlin.de. If you are fast enough, you will win a polymake mug :)

1. TROPICAL



- 1 (a) What is the value of a minimal perfect matching on this bipartite graph?
- (b) What is the value of a maximal perfect matching?
- 2 Is the tropical hypersurface defined by the polynomial

$\min(6+3x, 3+2x+y, 2+x+2y, 4+3y, 2+2x+z, x+y+z, 3+2y+z, 1+x+2z, -2+y+2z, 5+3z)$

smooth? (I.e. all triangles in the dual subdivision have volume $1/2$)

- 3 In how many maximal covector cells does the min tropical convex hull of

$$[[0, 1, 0], [0, 0, 2], [0, 3, 3], [0, 4, 1]]$$

get divided to?

2. TORIC

- 4 Let σ be the fan $\{\mathbb{R}e_1, \mathbb{R}e_2, \{0\}\}$. Is the resulting toric variety affine or projective?
- 5 Take the cone generated by

$$[[-1, 1, 1], [1, 1, -1], [1, -1, 1], [0, 0, 2]]$$

How many elements are there in the Hilbert Basis of this cone?

3. POLYTOPES

Consider the following polytope in \mathbb{R}^3 (the points are given in $\mathbb{R}P^3$)

$$P = \text{conv}([1, 1, 2, 3], [1, 2, -4, 6], [1, 7, -5, 9], [1, 10, 11, 12], [1, 0, 0, 0], [1, 6, 1, -4], [1, 3, 4, 5]).$$

6 How many edges does P have?

7 What is the coefficient of x^2 in the Ehrhart polynomial of P ?

8 What is the volume of the 4-dimensional cyclic polytope on 15 vertices?