MATH 4550: Applicable Geometry

Problem Set 3

Due at 2:54pm before class starts on February 26, 2015

You are allowed to work in groups, but the solutions you hand in should be written by you only. If you work in a group, you must write the names of your collaborators at the top of your assignment. Explain your reasoning to receive full credit. All problems are worth 10 points. You are strongly encouraged to type your solutions in LaTeX. In any case, please staple your psets!

P1 Let P be a convex polytope with the origin in its interior (remember, this means that there is a ball B_ϵ with radius $\epsilon > 0$ centered at the origin, such that $B_\epsilon \subset P$). Prove that $P^\triangle$, the polar of P, is a polytope. Is this also the case if the origin is in P, but not in its interior?

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P2 Prove that the polytope P is simple if and only if $P^\triangle$ is simplicial.

. . . . . .

P3 Write down all the faces of the cyclic polytope $C_3(t_1, t_2, t_3, t_4, t_5)$ (where $t_1 < t_2 < t_3 < t_4 < t_5$).

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P4 Characterize the faces of the cyclic polytope $C_d(n)$ using the characterization of its facets given in class.