MATH 4550: Applicable Geometry

Problem Set 4

Due at 2:54pm before class starts on March 5, 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 Pick a hexagon, and your favorite triangulation of it. Is the triangulation you chose regular? Justify.

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P2 Prove that the number of triangulations of an $(n+2)$-gon is equinumerous to the number of ways of drawing $n+1$ points on a horizontal line L in a plane and n arcs connecting the points such that: (1) the arcs do not pass below L, (2) starting at any vertex you can "walk along" a sequence of arcs to get to any other vertex, (3) no two arcs intersect in their interior, and (4) at every vertex, all the arcs exit in the same direction (left or right). Below you see the 5 such configurations for $n = 3$.

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P3 Construct two triangulations of the 3-cube (only using vertices of the 3-cube) with distinct number of 3-simplices in them.