MA 323 **4/16/05**

Combinatorial Geometry
I Eight My Problem Set

Instructions: Again, do any two of these problems. They're due on Thursday, April 21.

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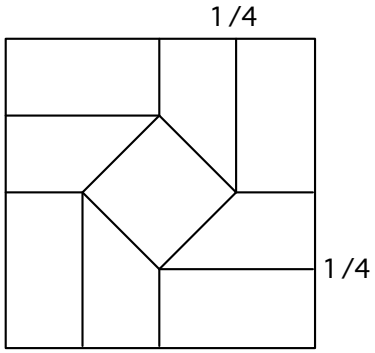
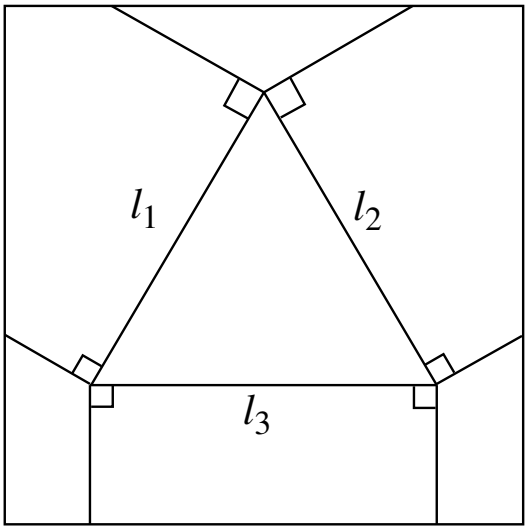
(1) We saw a degree 6 vertex in class that gave us $C(v; \alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6) = 12$. Find a different set of angles which gives us a smaller value, in particular $C(v; \alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6) = 8$.

(2) Below is shown the crease pattern for the **square twist**, which we folded in class. In how many different ways can this crease pattern be folded flat? Make sure you provide a proof of your answer.



(3) Consider the below crease pattern. Notice that each vertex satisfies Kawasaki's Theorem, and thus can be folded flat. Can the whole thing be folded flat? Explain.



(4) Prove the **Rabbit-Ear Theorem:** Given a triangle ABC, draw the lines made by the angle bisectors, along with another line drawn perpendicular to one of the sides from their point of intersection. Then these creases can fold the triangle flat. Furthermore, when folding the triangle flat in this way, the sides of the triangle will all lie on a straight line.