03-I-02

Triangulation

Tetrahedralization

- Schonhardt's Polyhedron

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Tetrahedralizability Guaranteed?

- We've seen that each simple polygon admits a triangulation
- But how about 3D polyhedra?

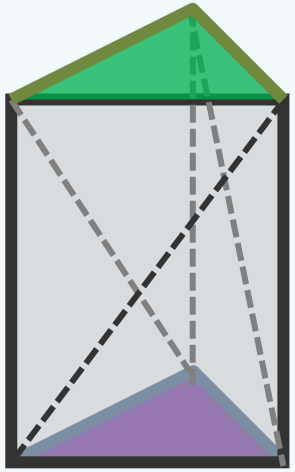
  Does every polyhedron admit a tetrahedralization?
- You can give dozens of example polyhedra in a few minutes

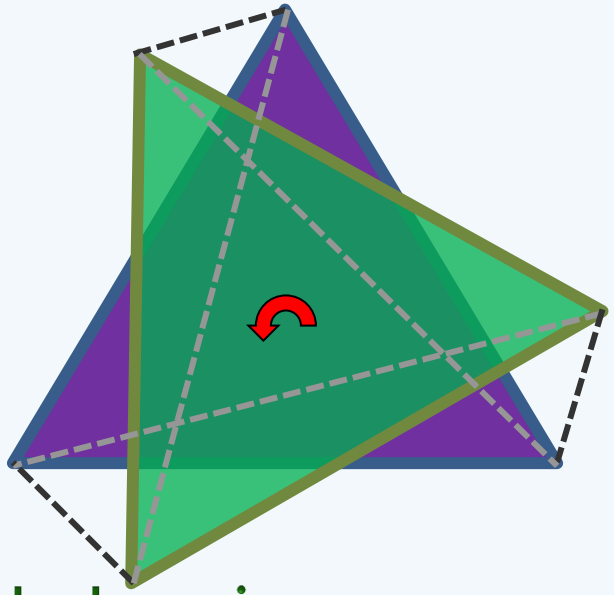
  showing that they do admit a tetrahedralization
- But this is not always true
- In fact, there exist counter-examples

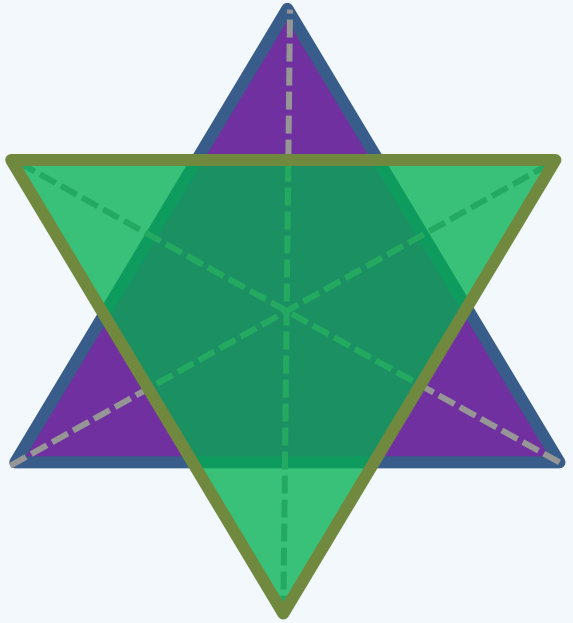
  which are surprisingly simple ...

Untetrahedralizable Polyhedron

❖ [Schönhardt, 1928] Schönhardt's polyhedron is untetrahedralizable







❖ In fact, Schönhardt's polyhedron is

the simplest one that can't be tetrahedralized

❖ [J. Ruppert & R. Seidel, 1992] It is NP-complete to determine

whether a polyhedron can be tetrahedralized