POLYGONS

includes its boundary
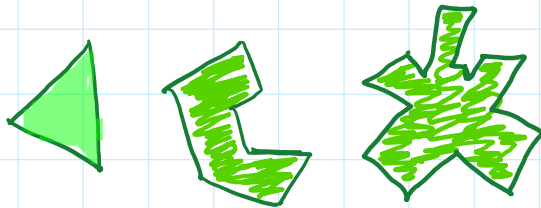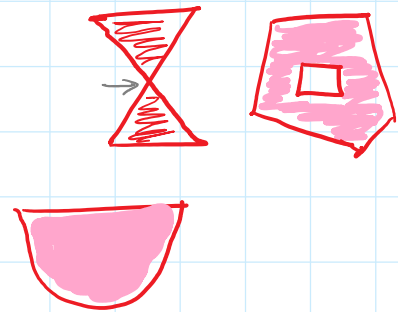
Definition: A polygon is a closed region of the plane bounded by a finite collection of line segments forming a closed curve that does not intersect itself.
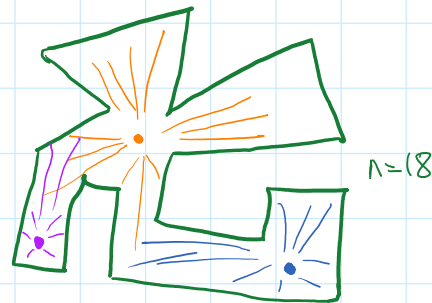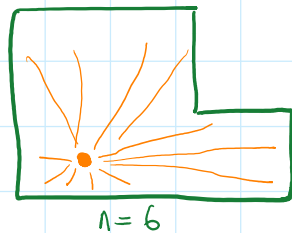
↳ loops back on itself

polygons:

Not Polygons:

ART GALLERY PROBLEM:
Suppose that an art gallery has a floor plan modeled by a polygon. A guard occupies a single point and can see in straight lines in all directions to the gallery walls.
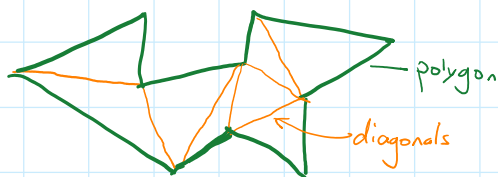
examples:

$n = 6$

$n = 18$

Question 1: If the polygon has n sides, what is the smallest number of guards guaranteed to protect the gallery?
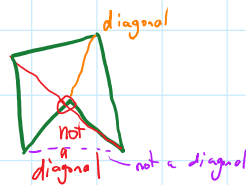
→ Try to find "bad" polygons — n-sided polygons that require "lots" of guards. Here, "lots" means a function of n.
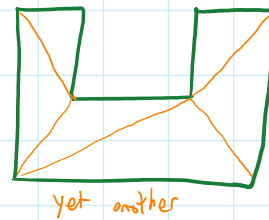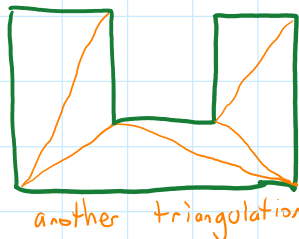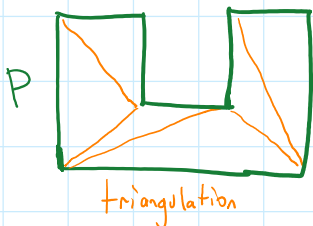
TRIANGULATIONS OF POLYGONS

polygon

diagonals

Let P be a polygon.

DIAGONAL: line segment connecting two vertices of P, that that doesn't touch the boundary of P except at its endpoints, and that lies in the interior of P.

diagonal

not a diagonal

not a diagonal

TRIANGULATION: A decomposition of P into triangles by a maximal set of noncrossing diagonals.

can't add more

P

triangulation

another triangulation

yet another

QUESTIONS:
- Does every polygon have a triangulation?
- How many triangulations are there for a given polygon?
- How many triangles are in each triangulation?

Course web site: math 282. mlwright.org