

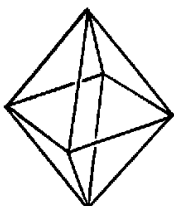
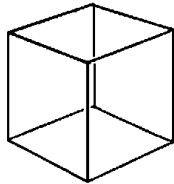
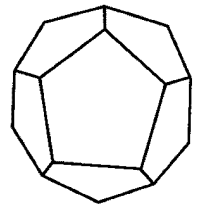
Math 113: Exam 3

Wednesday, March 12, 2008

Name: _____

Directions: Answer every question. Show appropriate work.

1. For each of the following shapes, determine whether or not it is a Platonic Solid. If it is a Platonic Solid, identify it by name. If it is not a Platonic Solid, write "not Platonic Solid."



2. There is an art gallery (polygonal closed curve) where we can view every spot in the interior with 12 cameras, but we can't do it with 11 or fewer. What can you say about the number of vertices?

3. Give a real-world use for each of these:

(a) Pythagorean Theorem

(b) Art Gallery Theorem

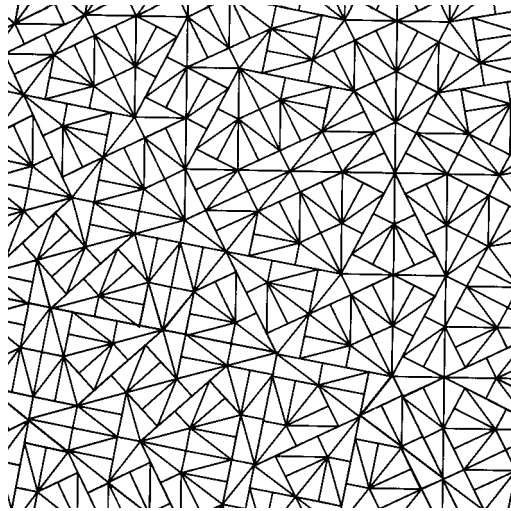
(c) Symmetry

(d) Looking at slices of an object in a different dimension

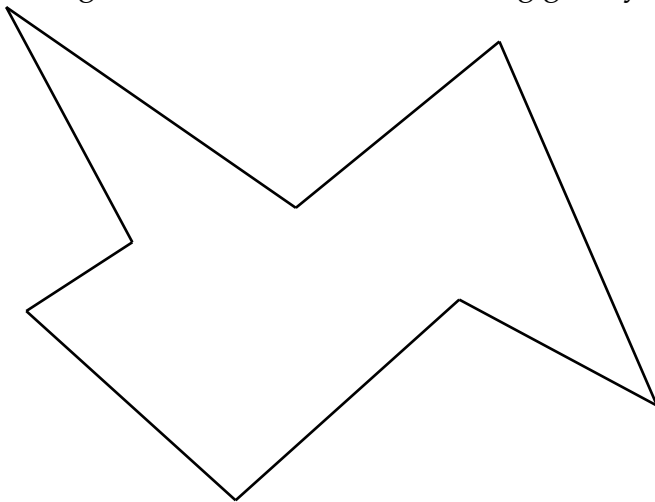
(e) Cube

4. (a) What is the name of the pattern illustrated below?

(b) Outline a super-tile and a super-super-tile.



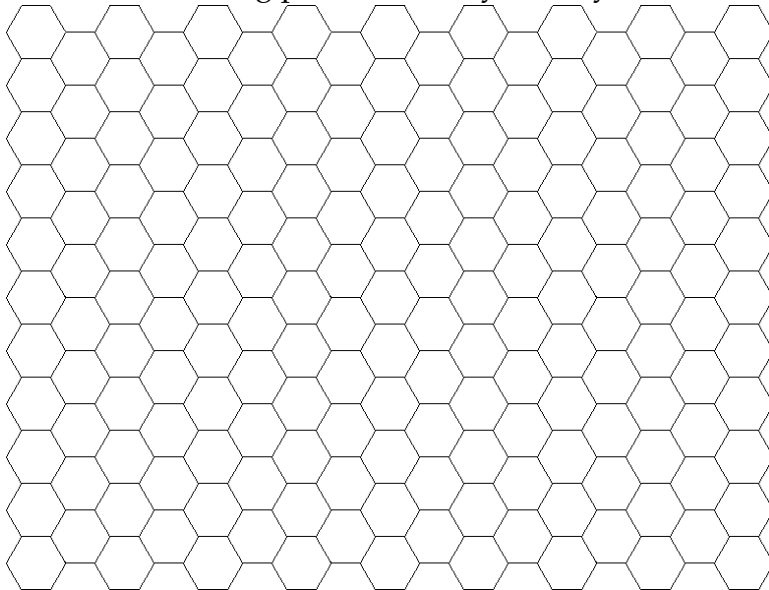
5. Triangulate and tricolor the following gallery. Where would you put the cameras?



6. (a) A rectangle has sides of length 8.1 cm and 15.2 cm. Show why this is not a Golden Rectangle.

(b) How would you change the length of **one** of the sides to make this a Golden Rectangle?

7. Does the following pattern have symmetry of scale? Why or why not?



8. Fill in the following chart about **squares** in different dimensions.

dimensions	name	number of vertices
0		1
1		
2	square	4
3		
4	hypercube	

9. You have a length of railroad track that measures 1 mile (5280 feet) long, firmly fixed at each end, with no gaps between the pieces of rail. On a hot summer day, the metal expands by two feet, buckling up in the middle and creating a triangle. Roughly how high would the midpoint be? Show all work. This is exactly the same as the problem from problem set 3.

10. Explain the difference between a **regular polygon** and a **regular polyhedron**.

11. What's wrong the following statement of the Pythagorean Theorem?

$$a^2 + b^2 = c^2$$

12. Prove the Pythagorean Theorem. You must have a complete proof, not just an example.