

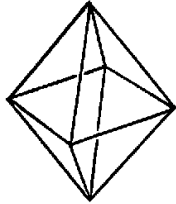
Math 113: Exam 3

Friday, March 23, 2007

Name: _____

Directions: Answer every question. Show appropriate work.

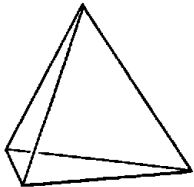
1. For each of the following shapes, determine whether or not it is a Platonic Solid. If it is a Platonic Solid, identify it by name. If it is not a Platonic Solid, write "not Platonic Solid."



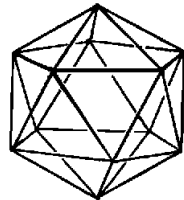
(a)



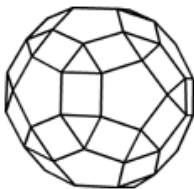
(b)



(c)



(d)



(e)

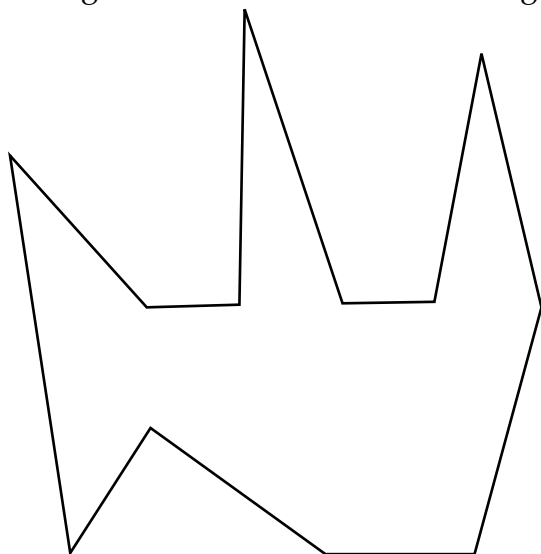
2. Give an example of an application of symmetry.

3. Prove the Pythagorean Theorem.

4. (a) Sketch an example of a regular polygon that is a simple, polygonal, closed curve.

(b) Sketch an example of a simple, polygonal, closed curve that is **not** a regular polygon.

5. Triangulate and tricolor the following gallery:



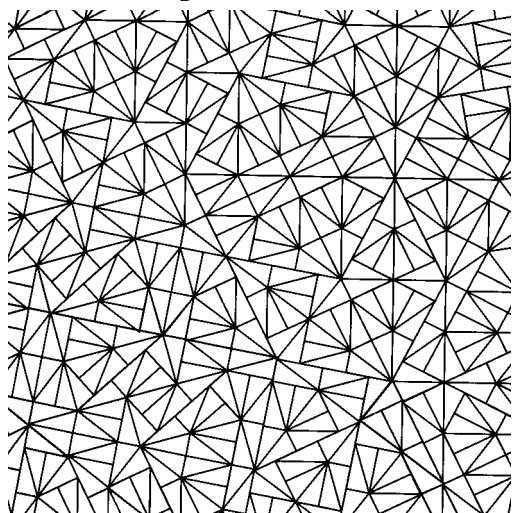
6. Imagine you are volunteering for Habitat for Humanity in Latin America (where they use metric measurements) and you are trying to make sure that the corner of the house you are working on is a right angle. One of the other workers measures 90 cm along one side of the corner and 120 cm along the other side of the corner. The line connecting these two points is 150 cm long. Do you have a right angle? Show all work.

7. (a) A rectangle has sides of length 5.2 cm and 10.1 cm. Show why this is not a Golden Rectangle.

(b) How long would the long side need to be for this rectangle to become a Golden Rectangle?

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

(b) Outline a super-tile.



9. I have a Golden Rectangle that is 30 cm long and 18.5 cm tall. What happens if I attach a square with side length 30 cm to the long side of my rectangle? Sketch the resulting shape and identify it by name.
10. How many dimensions are represented in each of the following examples?
- (a) Standard graphs from algebra class with an x and an y axis.
 - (b) Everything is the point.
 - (c) The world we live in, where objects have length, width, and height.
 - (d) A model of the universe (string theory) that has 3 spacial degrees of freedom, 1 time degree of freedom, and 6 additional degrees of freedom.
 - (e) The number line.
11. What is a 4D cube? You can either sketch one or else you can describe how one is constructed.
12. Explain what “duality” means in terms of the Platonic Solids.