

# Math 113: Exam 4

Wednesday, April 16, 2008

Name: \_\_\_\_\_

**Directions:** Answer every question. Show appropriate work.

1. Fill in the following chart with the names of the Platonic Solids, where  $s$  stands for the number of sides on a face and  $c$  stands for the number of edges meeting at a corner.

$s$	$c$	name
4	3	
3	5	
3	4	
5	3	
3	3	

2. Draw the polygonal presentation (edge identification diagram) for each shape:

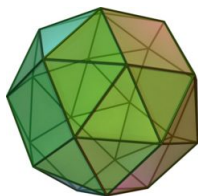
(a) torus

(b) Möbius strip

3. Consider the following letters from Helvetica. Classify them into categories based on equivalence by distortion.

b d f o p q s t v

4. A snub cube has six square faces, 32 triangular faces, 24 vertices, and 60 edges.



(a) Does this shape satisfy the equation for the Euler Characteristic?

(b) Is this shape a Platonic Solid? Why or why not?

5. Are the following symbols equivalent by distortion? Why or why not? Prove your answer.



6. Is a sphere equivalent by distortion to a torus? Why or why not?

7. List three ways in which a Möbius Band is different from a cylinder.

8. List a real-world application of the Möbius band.

9. A connected planar graph divides the plane into 123 regions. How many more edges than vertices does this graph have? Show all work.
  
  
  
  
  
  
  
  
  
  
10. List a real-world application of graph theory.
  
  
  
  
  
  
  
  
  
  
11. You have a strip of paper that has been given 19 half-twists and then had the ends taped together. How many sides does it have? How many edges does it have?
  
  
  
  
  
  
  
  
  
  
12. Auditions for Bavarian Bandstand, a new reality TV show to crown the next polka king, have attracted 6000 people. Unfortunately, only 60 of them have any real talent. Jimmy Sturr—who has won 17 Grammy awards in the polka category and has released such classic albums as *Polkapalooza*—has been asked to judge the initial audition round of the competition. Jimmy is 95% accurate at deciding whether someone has polka talent. Of the contestants who Jimmy deems talented, what percent of them have talent?