

# Math 113: Exam 4

Friday, April 20, 2007

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
3	3	
3	4	
4	3	
3	5	
5	3	

2. (a) Draw the polygonal presentation (edge identification diagram) for a torus.

- (b) Who won this game of tic-tac-toe on a torus? Show where the three-in-a-row is:

O	O	X
X	X	O
O		X

3. Consider the letters Y and F. Are they equivalent by distortion? Prove your answer.

4. When you cut the corners off a cube, you get a shape called a **truncated cube**. A truncated cube has eight triangular faces, six octagonal faces, 24 vertices, and 36 edges.

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

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

5. There are about  $620.5 \times 10^9$  passenger-miles flown each year and about 183 air-travel fatalities each year. There is one driving fatality for every  $10^8$  passenger-miles driven. What would be the effect on transportation fatalities if airlines were made twice as safe and as a result of increased costs 3% of air travel became road travel?

6. At a military base with 4000 service members, 1% of them have Medical Condition. The Army tests all the personnel on the base with a blood test that give accurate results 95% of the time. What percent of the soldiers who test positive for Medical Condition actually have the condition?

7. Find the date of Easter in 2035. (Use the provided information sheet.)

8. Use equivalence by distortion to categorize the following mathematical symbols. Group symbols that are equivalent by distortion together.

$\Upsilon$   $\otimes$   $\oplus$   $\wedge$   $\rightarrow$   $\setminus$   $\Omega$   $\aleph$

