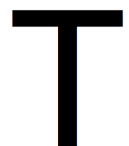
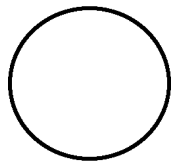
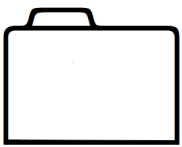


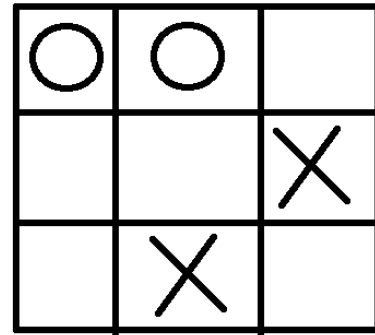
NAME:

1. [3] (4/4 Class) Explain how the square's dream in flatland about "The King" foreshadowed the remainder of the story.
2. [3] (Weeks §4) Explain what strange behavior the surveyors of Flatland exhibited once returning home.
3. [3] (HW3 #3) Group the following images into sets that have the same topology.

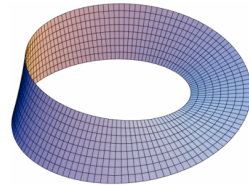
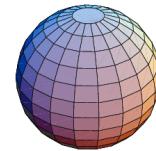
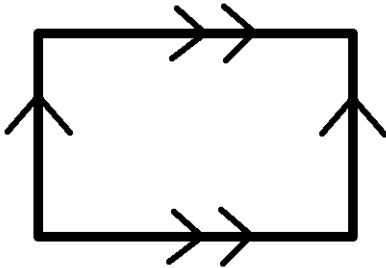


4. [3] (4/20 Class) Identify or describe two "non-traditional" patterns or uses for origami.

5. [3] (Weeks §4) A tic-tac-toe board being played on a Klein Bottle is shown to the right. The game was started by X and now it is X 's turn. What is X 's best move? Justify your choice.



6. [6] Match the items on the left to items with the same topology on the right.



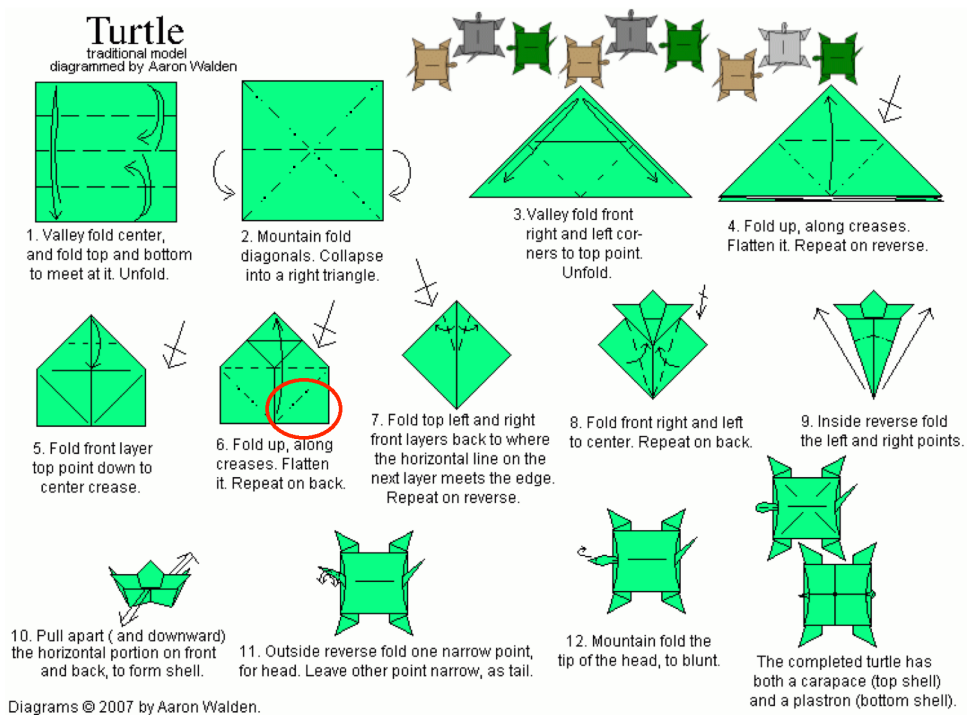
where all edges are identified

7. [3] (Weeks §3) Find a non-homogeneous 1 manifold.

8. [4] (HW2 #1) Find the signature for each of the following.



9. [2] (4/18 Class) Examine the Origami instructions below. Describe the kind of fold circled in the instructions.



10. [5] (Class 4/11 & HW3 #1) Identify all possible signatures of a two dimensional tiling that includes only blue symbols and the symbols 2. Be sure to explain clearly *how* you know you have found all the possibilities. (You should note any theorems you use!)

Symbol	Cost (\$)	Symbol	Cost (\$)
○	2	* or ×	1
2	$\frac{1}{2}$	2	$\frac{1}{4}$
3	$\frac{2}{3}$	3	$\frac{2}{6}$ or $\frac{1}{3}$
4	$\frac{3}{4}$	4	$\frac{3}{8}$
5	$\frac{4}{5}$	5	$\frac{4}{10}$ or $\frac{2}{5}$
6	$\frac{5}{6}$	6	$\frac{5}{12}$
...
n	$\frac{n-1}{n}$	n	$\frac{n-1}{2n}$

NAMES:

A single copy of this problem can be turned in per group if interested.

Halving the Area of a Triangle

1. [10] Given a triangle ABC on a patty paper, find a triangle inside $\triangle ABC$ that is half the area of $\triangle ABC$. Explain your process and *justify* why your method works. Make sure that your method works with all kinds of triangles and not just on special ones.

Hint: the area of a triangle is $\frac{1}{2} \cdot \text{base} \cdot \text{height}$.

This is a patty paper exercise so the only tools you may use are patty paper(s) and a pencil.

