Topology I October 2, 2012

Intro to Topological Equivalence and Exploring Möbius Bands

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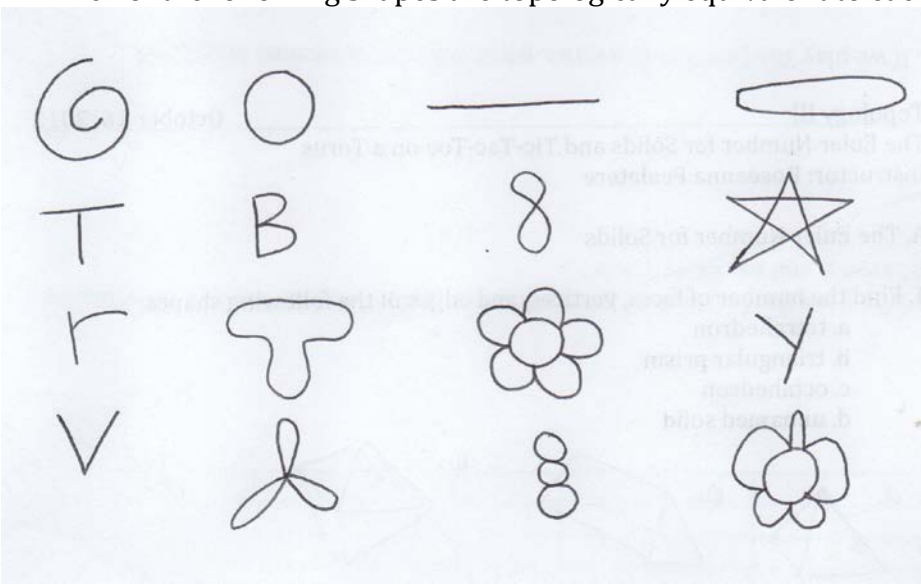
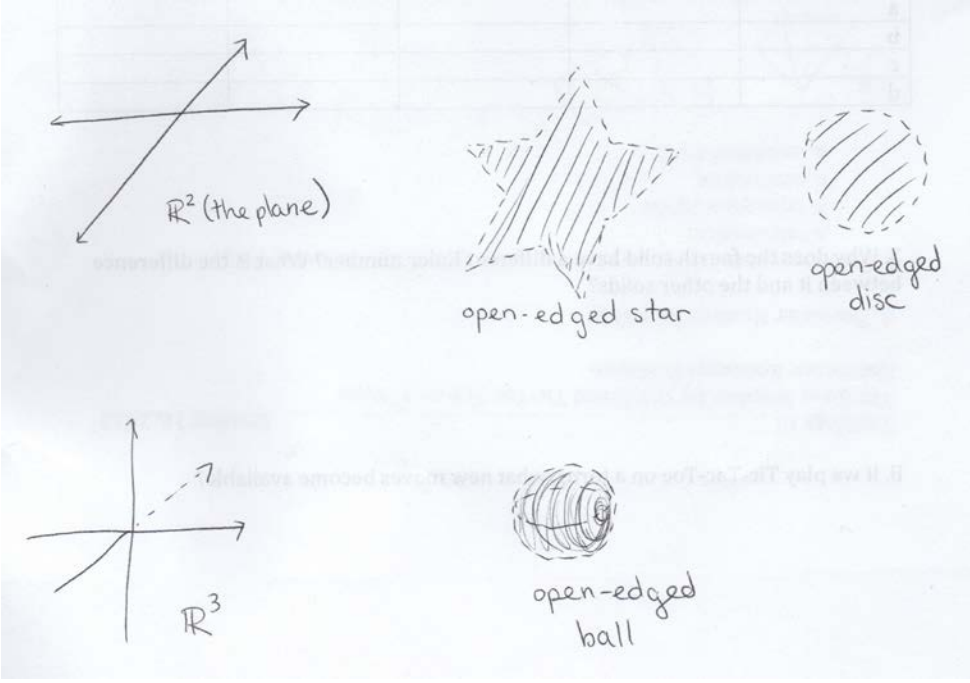
A. Topology is the study of shapes. Specifically, it is the study of the properties that don't change when the shapes are twisted or stretched. Size and proportion have no meaning in topology. To topologists, what matters most is the number of holes and certain kinds of twists. If you can twist and resize one shape into another, they are said to be topologically equivalent.

1. Which of the following shapes are topologically equivalent to each other?



2. Which of the following shapes are topologically equivalent to each other?



B. One of the most intriguing topological constructions is the Möbius band. Bring the two ends of a long, rectangular strip of paper together, flip one over, and tape them together to create your own Möbius band. Make sure you tape all the way around.

1. How many sides does your piece of paper now have?

2. What happens if you cut a Möbius band lengthwise down the middle?

3. What happens if you cut a Möbius band lengthwise in thirds?