Writing Assignment 8

Due Friday, October 16, 11:59 PM

You have probably heard of a shape called a *cylinder* before. (For example, the cardboard core of a roll of toilet paper is a cylinder.)

Another way to describe a cylinder is as the image of the function

$$j : [-1, 1] \times [0, 2\pi] \to \mathbb{R}^3, \qquad (t, \theta) \mapsto (\cos(\theta), \sin(\theta), t).$$

(Sometimes, mathematicians will demand that the cylinder be infinitely tall, but we'll ignore that here.)

Let's say all that somebody had was a piece of paper and some glue. How would you instruct them to construct a cylinder?

Now, let P be the set of points comprising that sheet of paper. If you like, you can model it as some rectangle inside of $\mathbb{R}^2$. How would you describe the cylinder using an equivalence relation on P?

The key of this assignment is to show me that you understand how equivalence relations can be used in constructing new shapes.