## Handout: Peeling a Donut

Suppose we took a grid and simultaneously rolled it both vertically and horizontally at the same time, matching all the horizontal lines together and all the vertical lines together, in order to make a donut as described in the previous handout, and suppose we now mark all the points that the line $y = 3x$ touch on our donut.

1. Convince yourself that this is equivalent to starting with the following square and identifying the top and bottom edges together, and the side edges together:
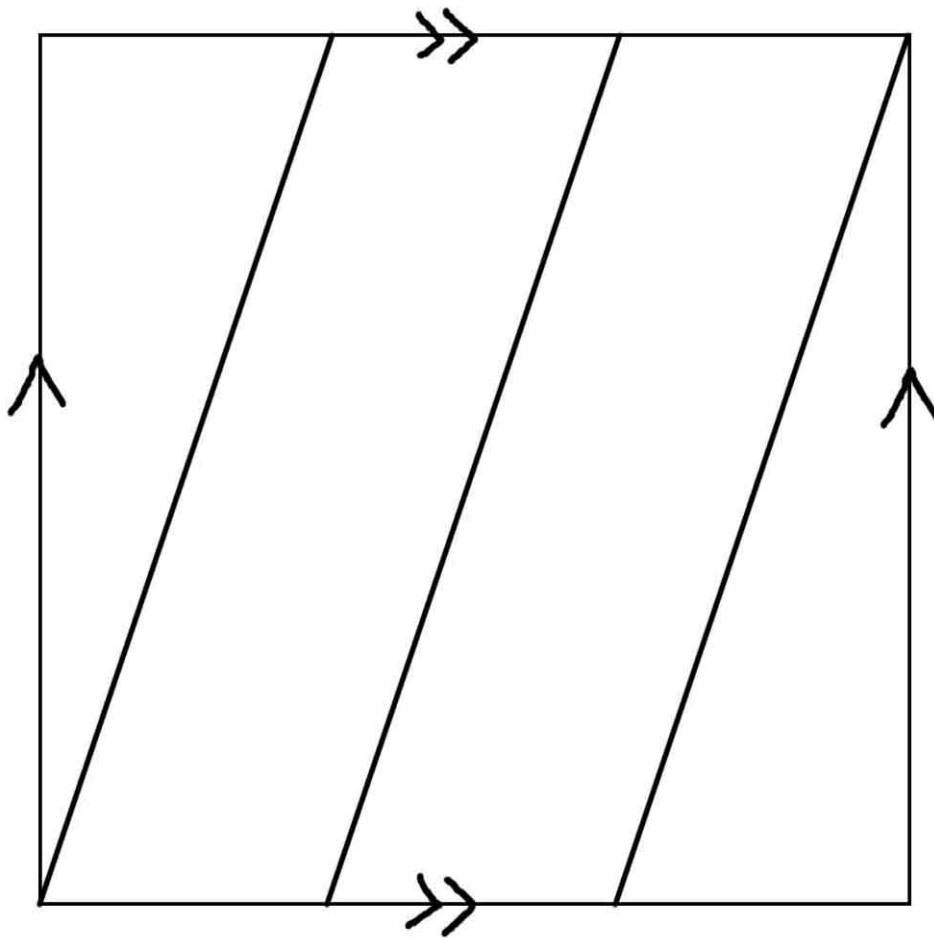
   Now suppose we have an adjustable peeler and line it up with the gap between the marks on our donut.
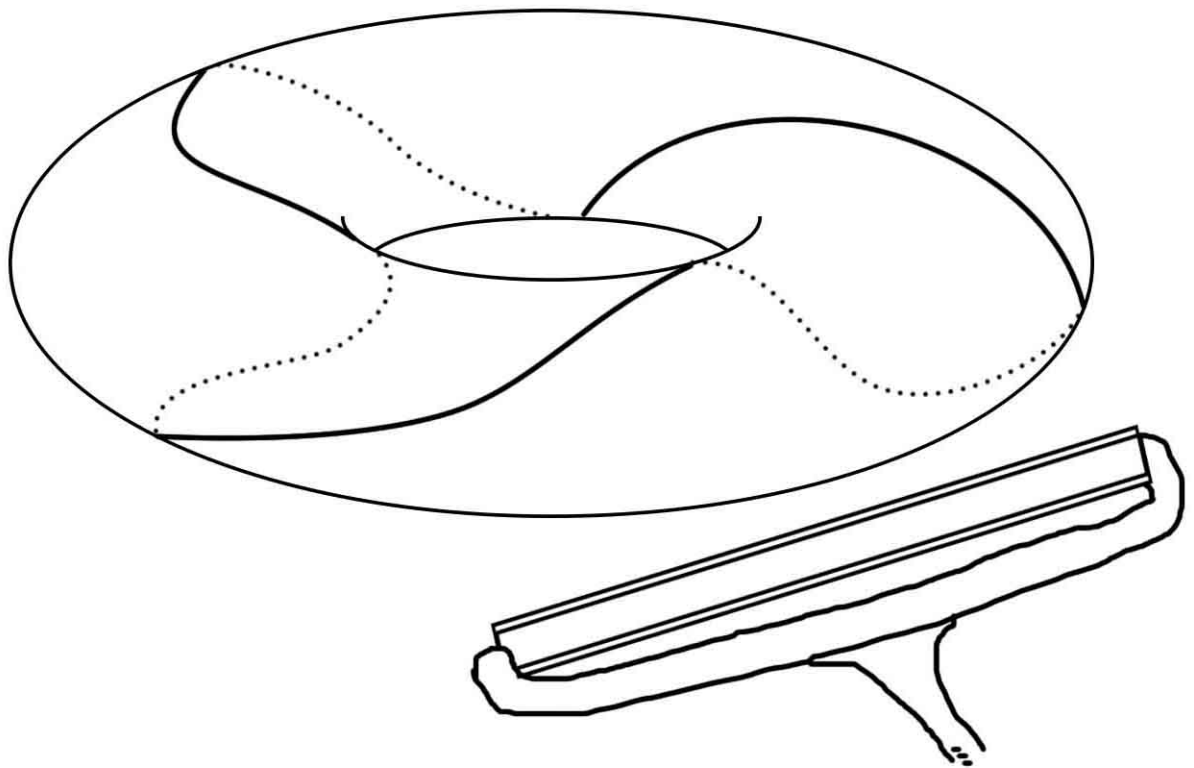
And we peel off a ribbon or ribbons

2. How many connected pieces of ribbon do we get?

3. What if we cut along:
$$y = \frac{3}{2}x$$

How many ribbons do we have?

4. How about:
$$y = \frac{p}{q}x$$

where p, q integers.