Pre-class Warm-up!!!

What is a relation on a set X ?

a. A rule a*b for multiplying elements of X together. 1

✓b. A specification a*b that some pairs of elements of X might have and others might not. 5

✓c. A subset of X x X. n - 1

Write $a*b \iff (a,b)$ lies in the subset of X.

d. A specification a*b for all pairs of elements of X. 2

e. A mapping X -> X. 1

f. Something else. 0

What conditions does an equivalence relation satisfy?

a. a*a = b for all a and some b

✓ b. a*a for all a reflexivity

c. a*b = b*a

✓ d. a*b => b*a symmetry

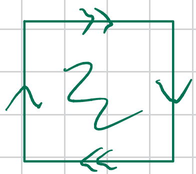
✓ e. a*b and b*c => a*c transitivity

f. a*b and b*a => a = b

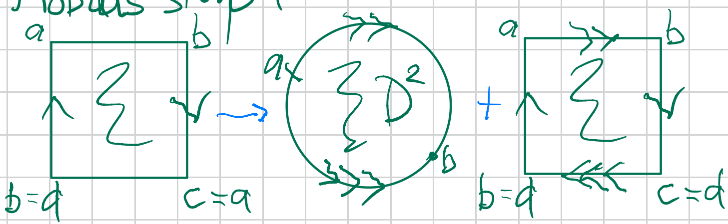
Start exam $\leq$ 1:25

Proposition. 1. The projective plane is one Möbius strip with its boundary sewn onto a disc.
2. The Klein bottle is two Möbius strips, identified along their boundary.

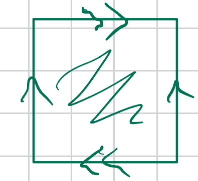
$\mathbb{RP}^2$ is

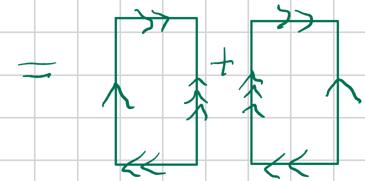


Möbius strip:



Klein bottle is





Doing only the >> gluing on each rectangle we get

Möbius strip + Möbius strip.

which then get glued along their boundaries.

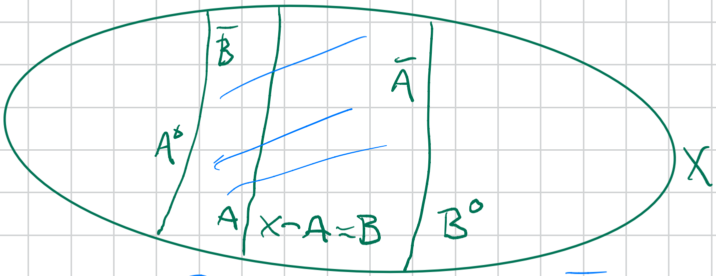
Review

Interior, closure, boundary

Interior A° = largest open set contained in A

Closure $\overline{A}$ = smallest closed set containing A

$\partial A = \overline{A} - A^\circ$



$\partial A = \partial B = \overline{B} \cap \overline{A}$ is closed

Metric spaces

Most examples on $\mathbb{R}$, or $\mathbb{R}^2$ look the same topology.

A finite top sp is metrizable $\Leftrightarrow$ it has the discrete topology.

the $B_\epsilon(x)$ form a basis for the topology.

Funny topologies

on finite sets e.g. $a \; b \; c$

Discrete, indiscrete topology.

Continuous, open, closed mappings

Topologies $\mathcal{U}_1, \mathcal{U}_2$ on X are the same

$\Leftrightarrow$ $(X, \mathcal{U}_1) \xrightarrow{1} (X, \mathcal{U}_2) \xrightarrow{1} (X, \mathcal{U}_1)$

are continuous.