TOPOLOGY

Syllabus

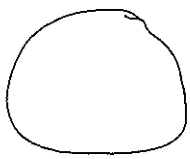
ch.1 Deformations

map doughnut to coffee mug

ch.2 Knot Theory

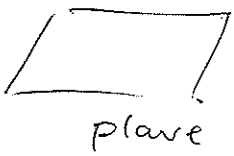


deformations at work

ch.3 surfaces

we will classify all surfaces – objects with 2 dms of available directions


plane

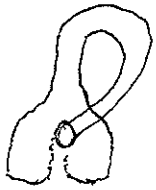

sphere


torus


2-holed torus

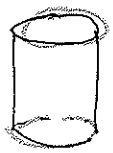
~~We care most about~~


Möbius band


Klein bottle

We care most about surfaces that don't go out infinitely far (bounded) and that don't have a boundary.

boundary is a circle



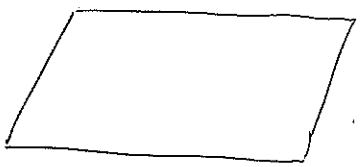
hollow cylinder

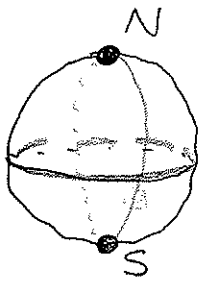
bdy = 2 circles.

3. 3-manifolds

Let's go up 1 dimension. The analog of a surface that has 3 directions of motion is called a three-dim. manifold.

Example plane and sphere

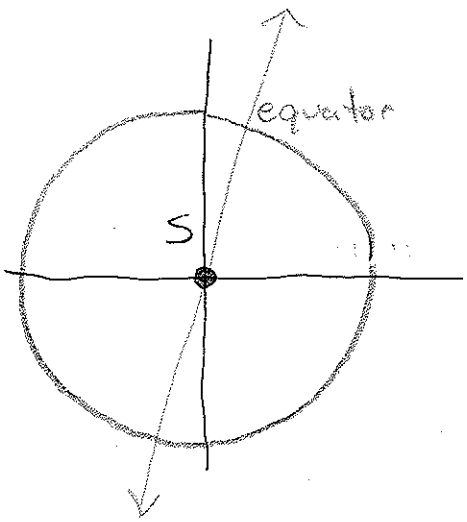




remove the north pole N

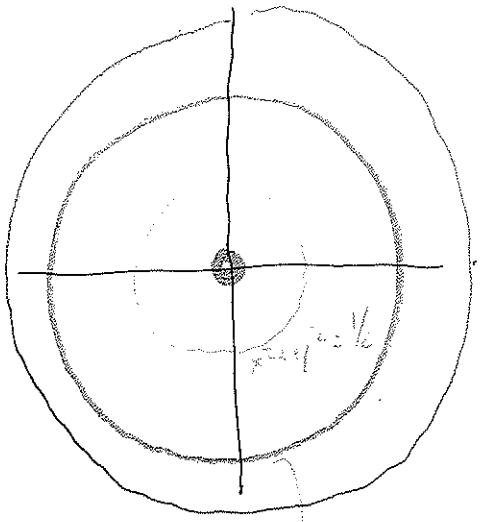
set S on origin

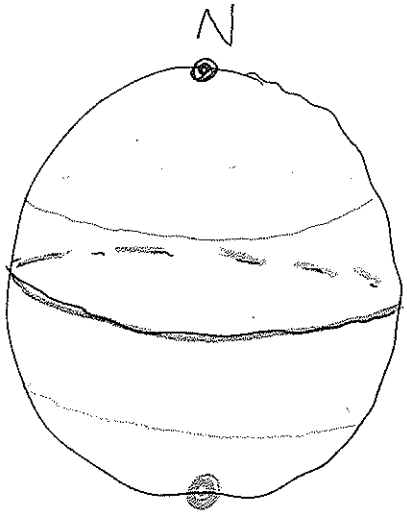
view every longitude circle as a line (through the origin) in the plane.



We get a map

sphere ⟶ plane



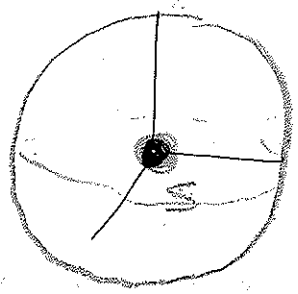


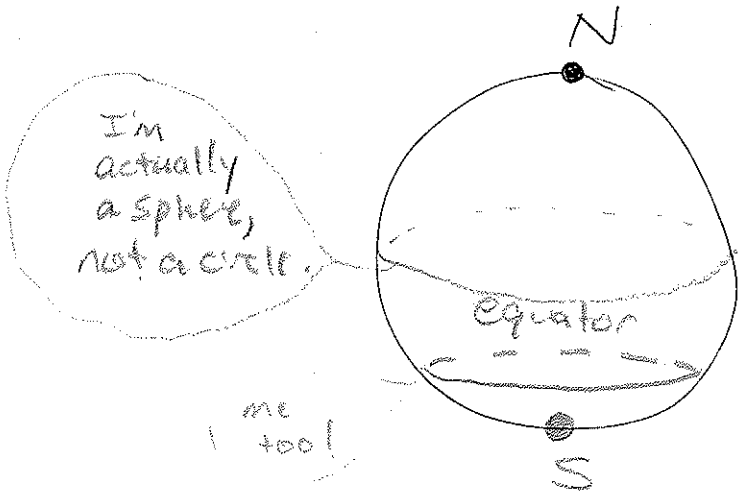
what "point" on the left corresponds to the north pole N?

Go up one dimension

$\mathbb{R}^3$

three-dim. sphere in $\mathbb{R}^4$





what "point" on the left corresponds to N?