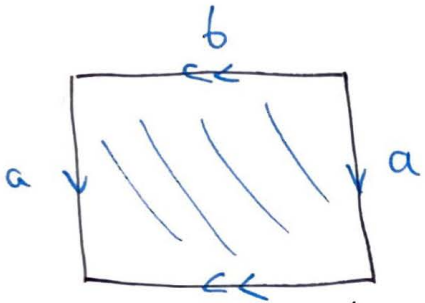
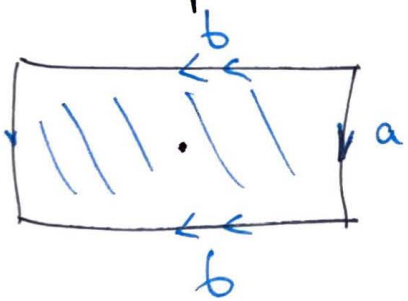
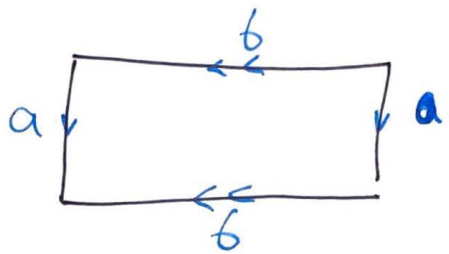


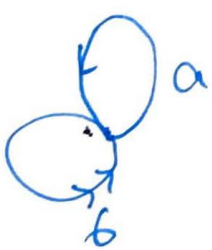
$\sim T^2$ by identification of the CW complex

Take a point out

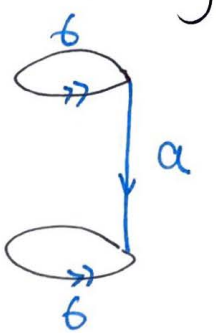
$A =$ 

by retraction $\sim$ 

$\S$ by identification of a

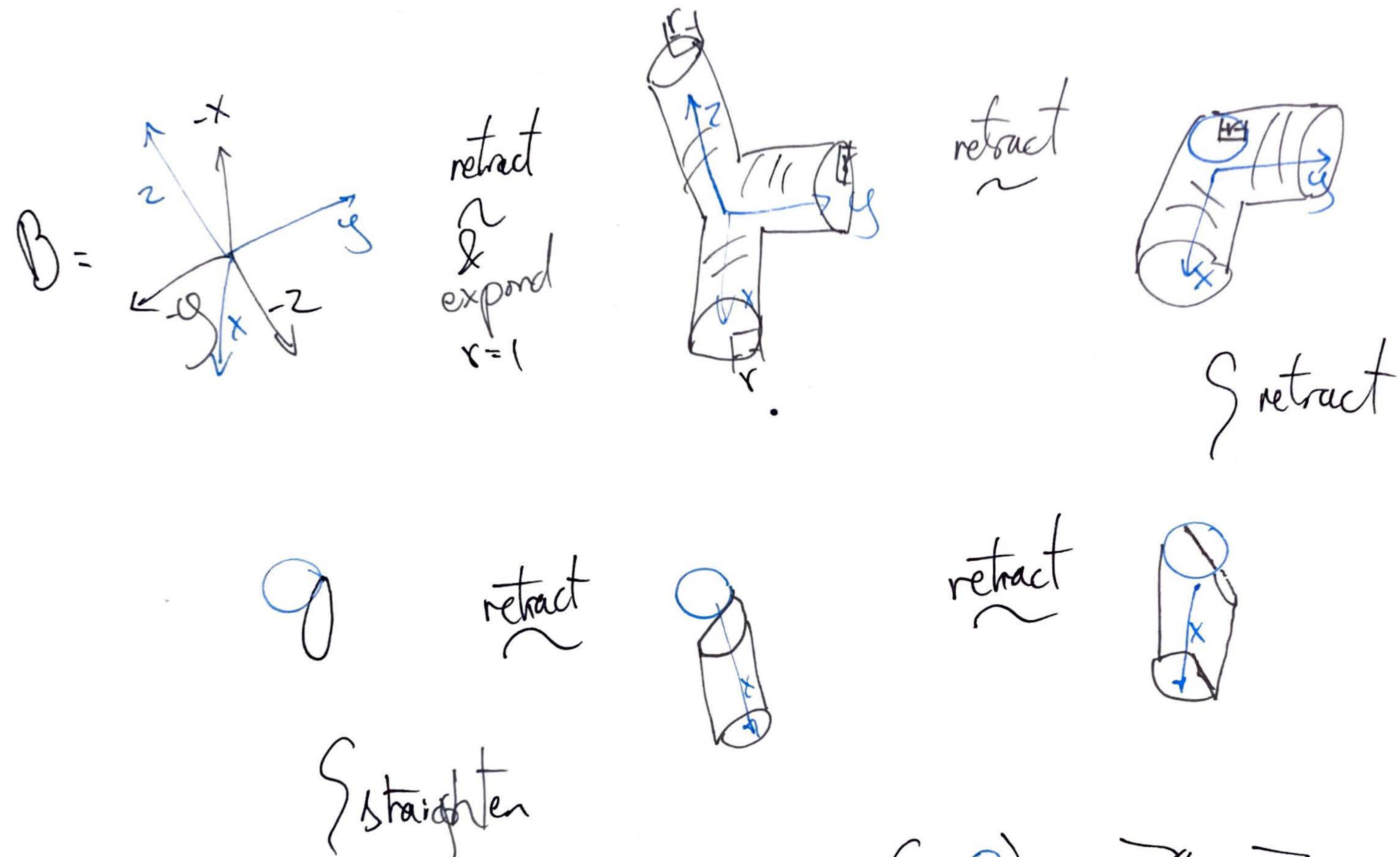


by identification of b



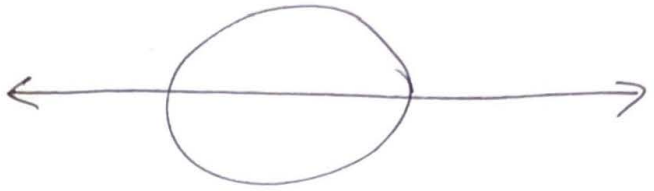
$\S$ by straitening out

$\Rightarrow \pi_1(A) = \pi_1(\infty) = \mathbb{Z} * \mathbb{Z}$



$\Rightarrow \pi_1(B) = \pi_1(\infty) = \mathbb{Z} * \mathbb{Z}$

$C = S^1 \cup (\mathbb{R} \times \{0\}) =$



$\simeq$ retract

retract $\sim$

rotate $\sim$

$\Rightarrow \pi_1(C) = \pi_1(\infty) = \mathbb{Z} * \mathbb{Z}$