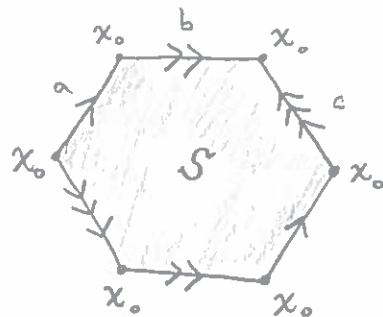


Topology  
Quiz 8

Name: \_\_\_\_\_

Consider the "mystery surface":

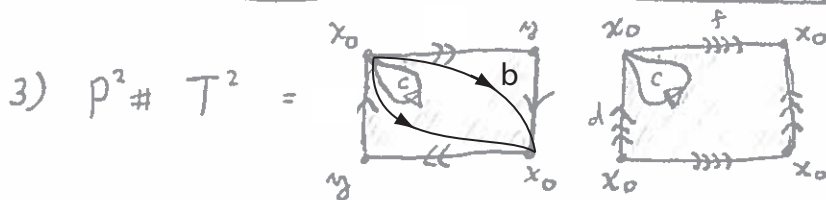


1) Find  $\chi(S)$ .

\_\_\_\_\_

2) Find a presentation for  $\pi_1(S)$ .

$\langle a, b, c \mid \quad \rangle$

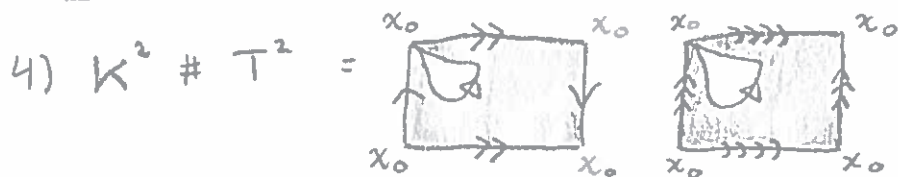


a) Find  $\chi(P^2 \# T^2)$ .

\_\_\_\_\_

b) Find a presentation for  $\pi_1(P^2 \# T^2)$

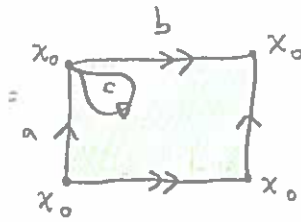
$\langle b, c, d, f \mid \quad \rangle$



Find  $\chi(K^2 \# T^2)$ .

\_\_\_\_\_

5)  $T^2 - D^2$



a) Find  $\chi(T^2 - D^2)$

b) Find a presentation of  $\pi_1(T^2 - D^2)$

$\langle a, b, c \mid \quad \rangle$

6) Recall:  $\chi$  and  $\pi_1$  are homotopy invariants, and thus also homeomorphism invariants.

That means, from (4),  $S \not\cong K^2 \# T^2$ , and  $S \not\cong K^2 \# T^2$ .

However,  $\chi$  and  $\pi_1$  don't tell us which spaces are homeomorphic. A cut-and-glue sequence allows us to construct a homeomorphism.

