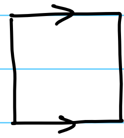
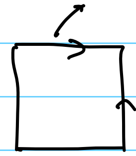
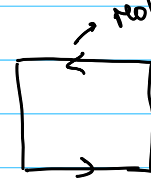
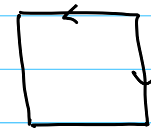
HOMEWORK -2

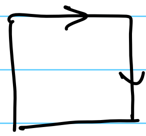
Q1 One pair.

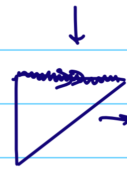
1  cylinder

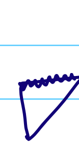
2. 

3  möbius strip.

4. 

5. 

 → closed disk.

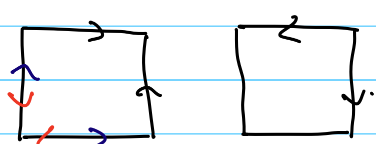
 closed disk.

↳ not sure but online source says Möbius strip.

Two pair.

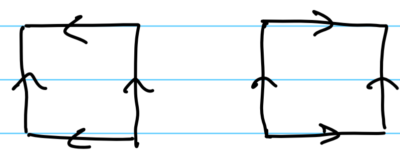
for all possibilities $\frac{{}^4C_2}{2} \times 2^4 \times \frac{1}{2} = 24$ possible.

pairings, CW-ACW for each edge, repeated / rotated.



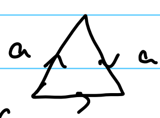
2 cases, 2 cases.

4 cases (S^2)

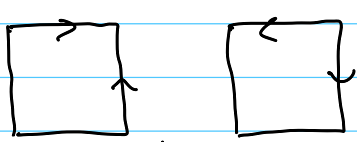


2 cases. ($\mathbb{T}^2$)

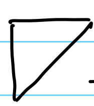
Both rotated ($\mathbb{R}P^2$)



↳ $\mathbb{R}P^2$ now we know.

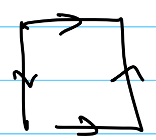


↓ produces two.

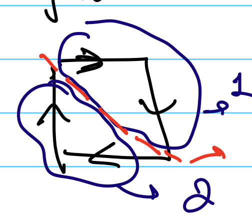
 → all of these +

One rotated one not ($\mathbb{K}^2$)

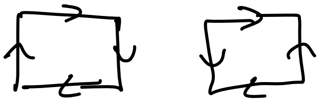
So the parallel edges are easy case all



+ adjacent & möbius strip joined

⇒ all 

along this boundary !!



Qu2] 1st one is not a triangulation of a $\mathbb{T}^2$ as visually you can see that the point S does not have enough dimensions

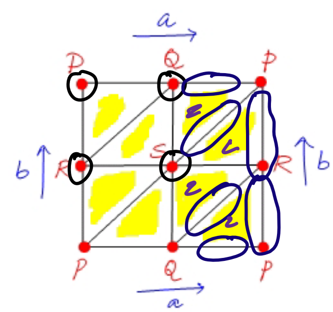
→ all these point are converging at the center making it flat

as all edges are part of at max 2 triangles it is a manifold.

$\chi = \underset{\text{points}}{4} - \underset{\text{edges}}{6} + \underset{\text{face}}{4} = 2$

also we know $\chi(\mathbb{T}^2) = 0$

This is enough to prove not homeomorphic.



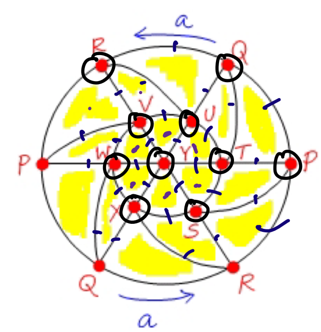
2nd.

$\chi = 10 - 27 + 18 = 1$

$\chi(\mathbb{R}P^2) = 1$

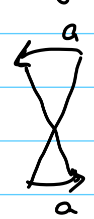
but this is not enough we need to check orientability.

12×3, $12 \times 2 = 24$, 6×12, 18



χ + orientability → Complete invarient

We need to find a möbius strip which can be seen in the marked

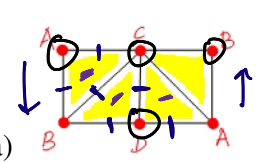


⇒ non oriantable

⇒ $\chi = 1$ + non oriantable ⇒ $\mathbb{R}P^2$

★ Sanity check each edge 2 triangles.

Qu3?

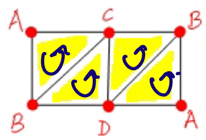


(a)

$\chi = 4 - 6 + 3 = 1.$

+ non oriantable → $\mathbb{R}P^2$

möbius strip.



(b)

$\chi = 4 - 7 + 3 = 0$

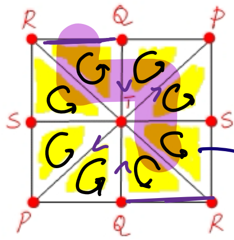
this is non-oriantable.

hence its a. $\mathbb{K}^2$

$\chi = 5 - 8 + 4 = 1.$

this is non oriantabe

hence $\mathbb{RP}^2$



(c)

Möbius strip.??