Consider

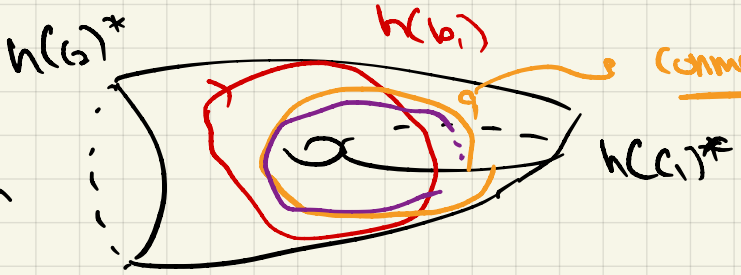
$S \to$ 1 punctured torus

c_1, c_2

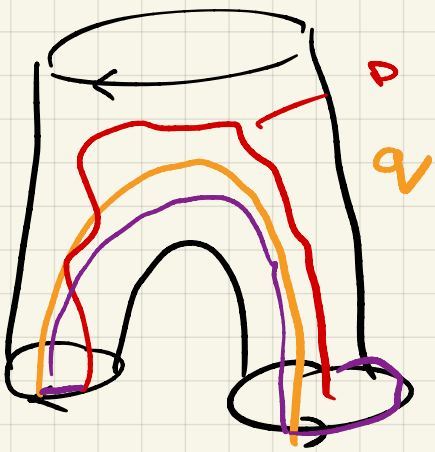
↳ pants decomp

Now $X \to S$

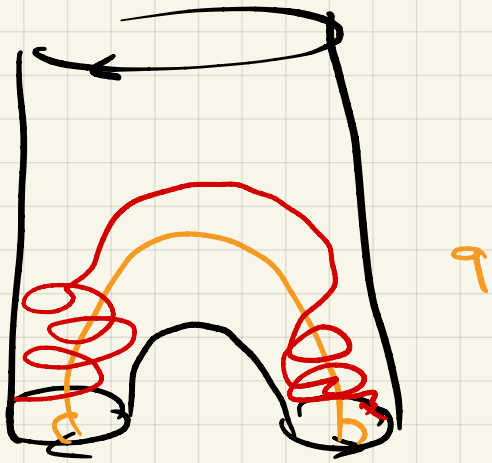
cut along $h(c_i)$



Assume, $h(c_i) = h(c_i)^*$



more complex



this is $4+$ gap

Showed, $h(b) \simeq a * q * f$]

a, f are monotonic in cuffs

(and this htpy is rel to endpts)

On X, $h(b_i) \simeq q * f * \bar{a}$ ← backwards.

pull tight (rel endpts)

↳ Not rel to endpts

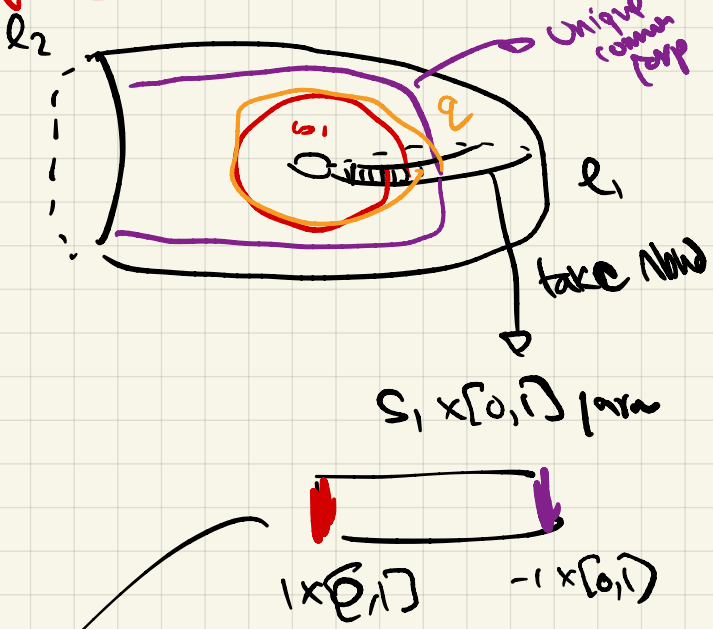
htpy of $\circlearrowleft$

so can shift order cyclically & add loops.

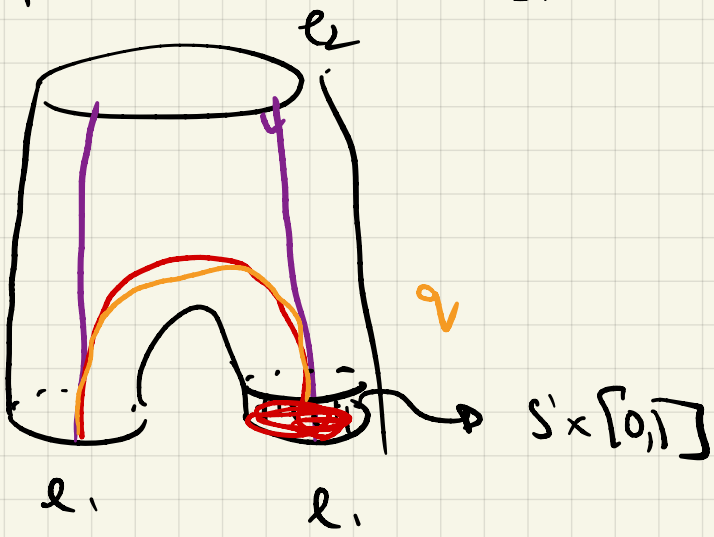
$$t_i = \frac{\text{signed len } f * \bar{a} \text{ tight}}{\ell(h(c_i)^*)}$$

Intuition: Pay the twist at the cuff of pants!

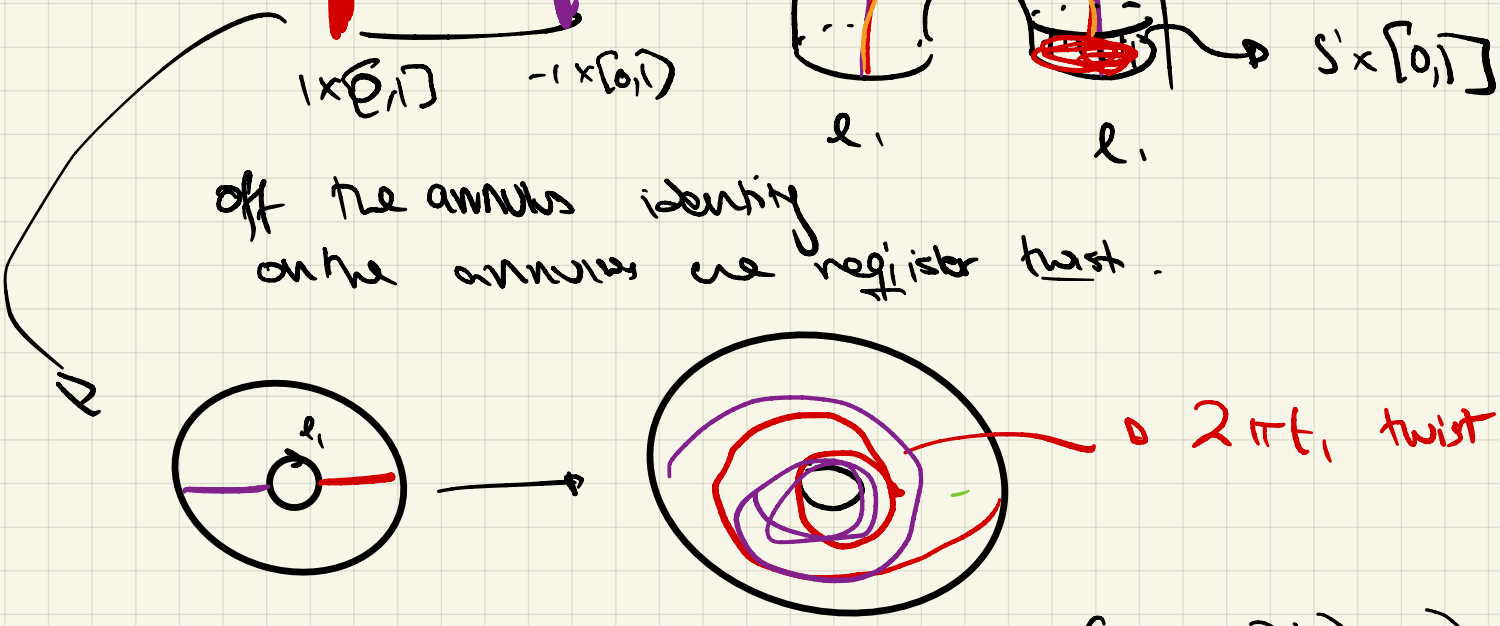
by cuts: l_1, l_2, t_1



build a geodesic pair of pairs with len l_2, l_1, l_1



off the annulus identity on the annuli we register twist.



$$h(e^{2\pi\theta i}, s) = \left(e^{2\pi(\theta + (1-s)t_1)}, s\right)$$

Then h defined as such and glue red to red, green to green

$\Rightarrow$ get pair of pants w l_1, l_2 twist t_1 with reg h.

read $9g-9$ theorem $(6g-5?)$