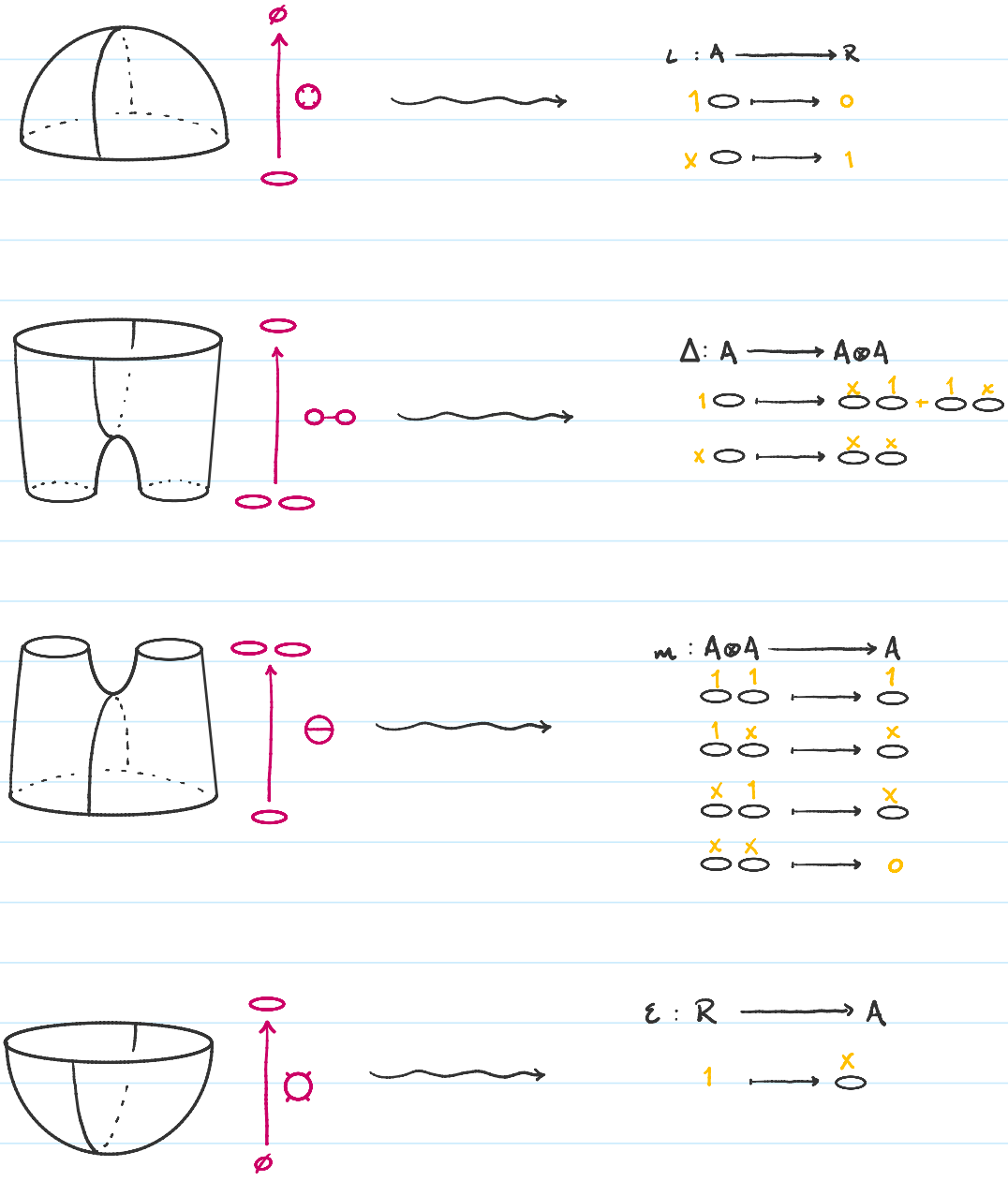
Talk: MPIM 2 (hand out)

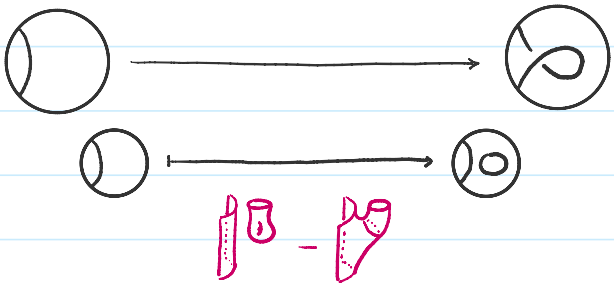
September 9, 2021 1:35 PM

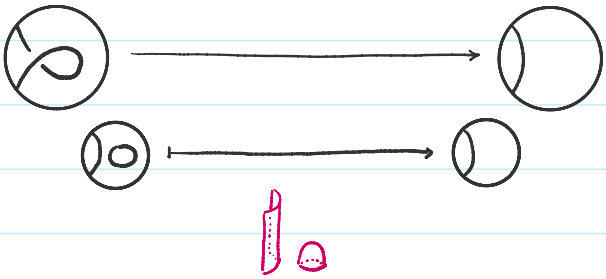
Here are the maps from last time, used to define our TQFT. Note the new shorthand for these cobordisms.



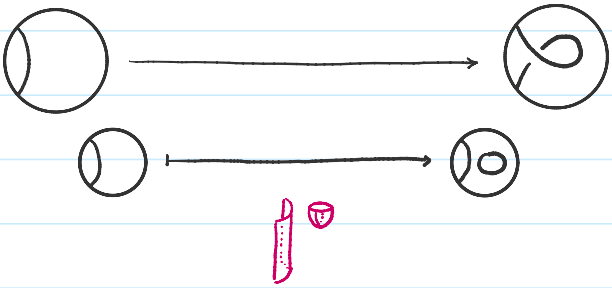
Here are the Reidemeister I and II induced maps. We relate smoothings by linear combinations of cobordisms. Given a labeling, we apply the corresponding Morse induced map. Smoothings not shown are mapped trivially (to the "zero cobordism").

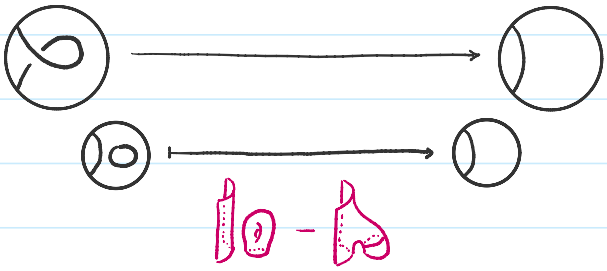
POSITIVE RI



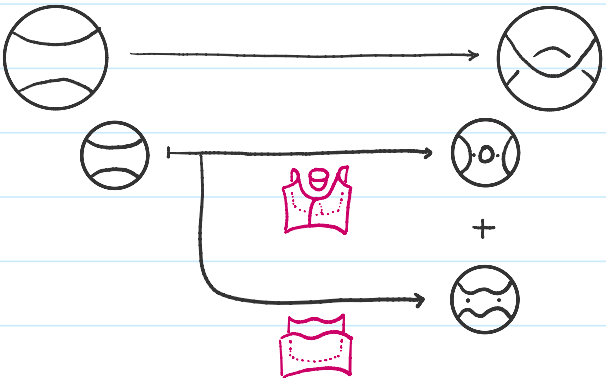


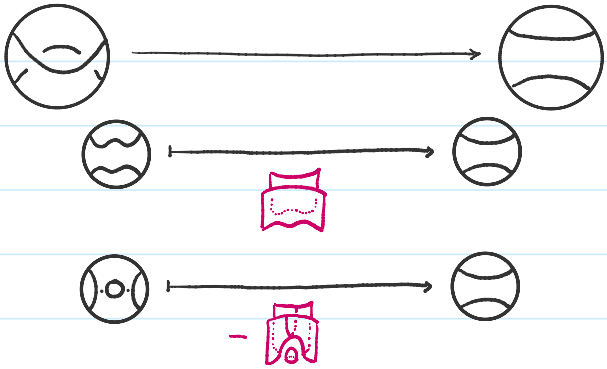
NEGATIVE RI



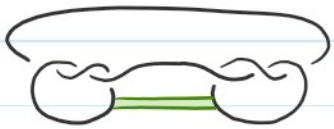


RII





Exercise Find $\phi \in Kh(3, \#m(3,1))$ so that the slice disk D illustrated below satisfies $Kh(D)(\phi) = 1$.



(a) Write out a movie for this slice disk

(b) Find a candidate cycle ϕ

i. What bigrading is $Kh(D)$ supported in?

ii. How many 0 and 1 smoothings does ϕ have?

iii. How many 1 and x labels can ϕ have?

iv. Make some guesses at ϕ

v. Make sure ϕ is a cycle $(d\phi = 0)$

(c) Show $Kh(D)(\phi) = \pm 1$.

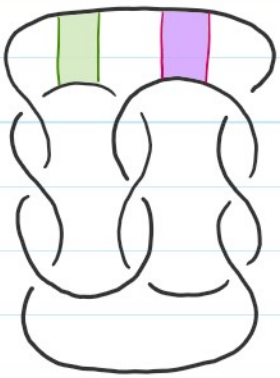
(d) **Bonus** Find a second class with this property.

Exercise Here are two slice disks D_ℓ and D_r for 9_{46}, given as band moves. Show that they induce distinct maps $Kh(D_{\ell,r}) : Kh(9_{46}) \longrightarrow Kh(\emptyset)$

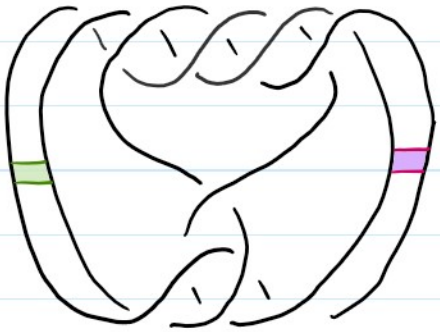
(a) Follow above steps to find $\phi \in Kh(9_{46})$

(b) Show $Kh(D_\ell)(\phi) = 0$ and $Kh(D_r)(\phi) = 1$

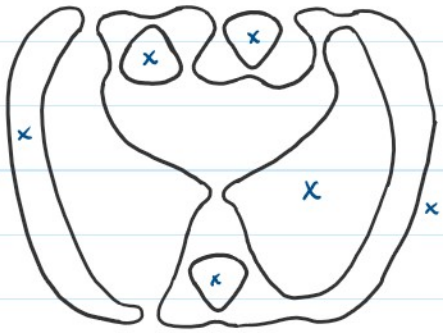
(c) What can we conclude about D_ℓ and D_r?

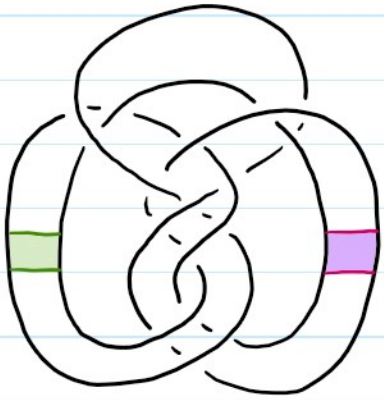


Exercise Show the surfaces below are distinct by distinguishing their induced maps on the given homology class.

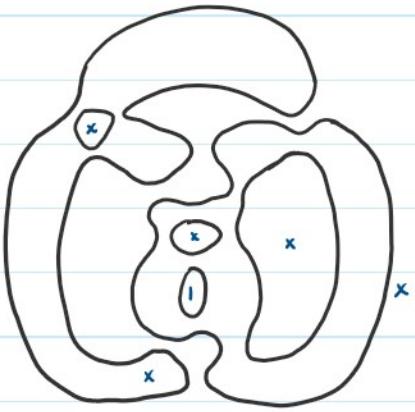


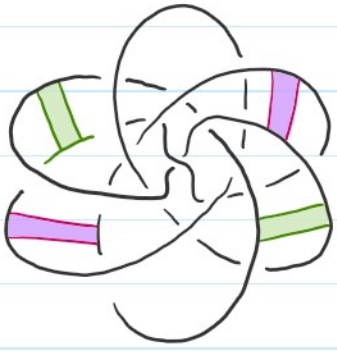
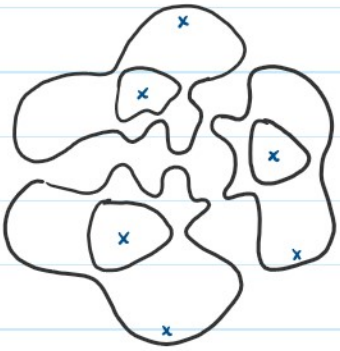
$\phi =$





$\phi =$





$\phi =$