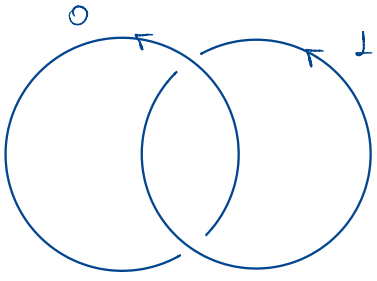
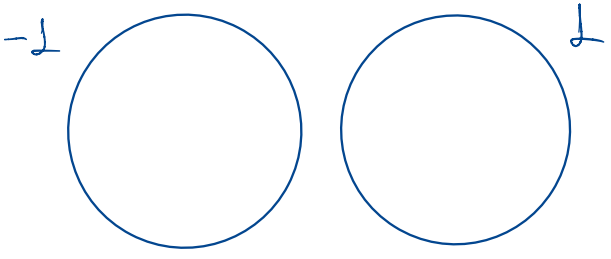
HW - Kirby Calculus

Solutions

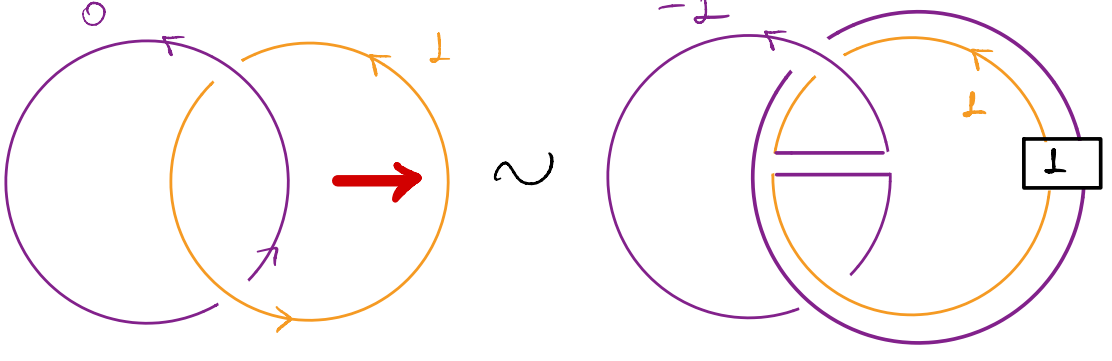
1 Show that





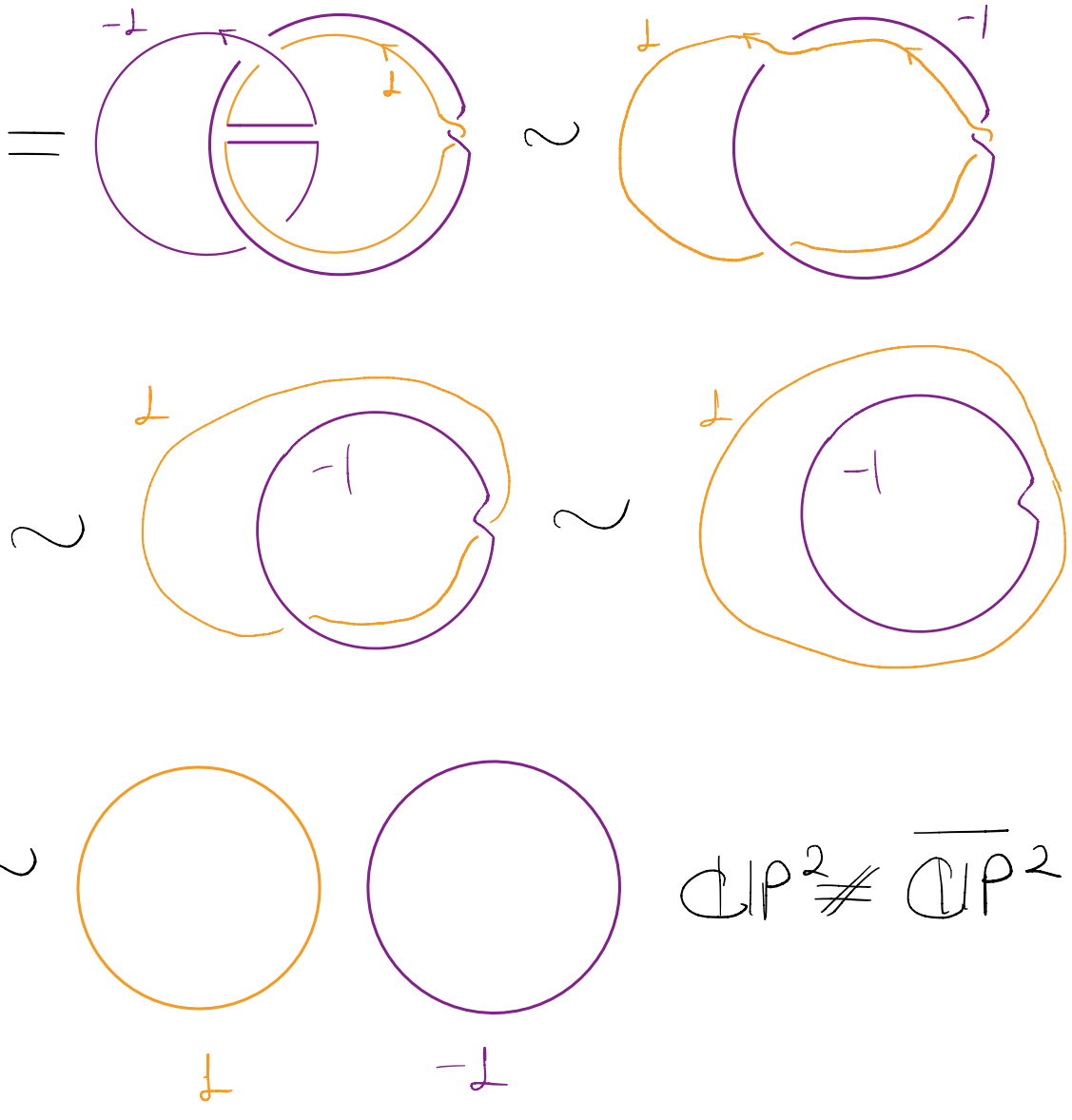
Solution:

$$S^2 \tilde{\times} S^2$$



$$lk(K_1, K_2) = \frac{1+1}{2} = 1$$

$$m' = 0 + 1 - 2\,lk(K_1, K_2)$$
$$= 0 + 1 - 2 = -1$$



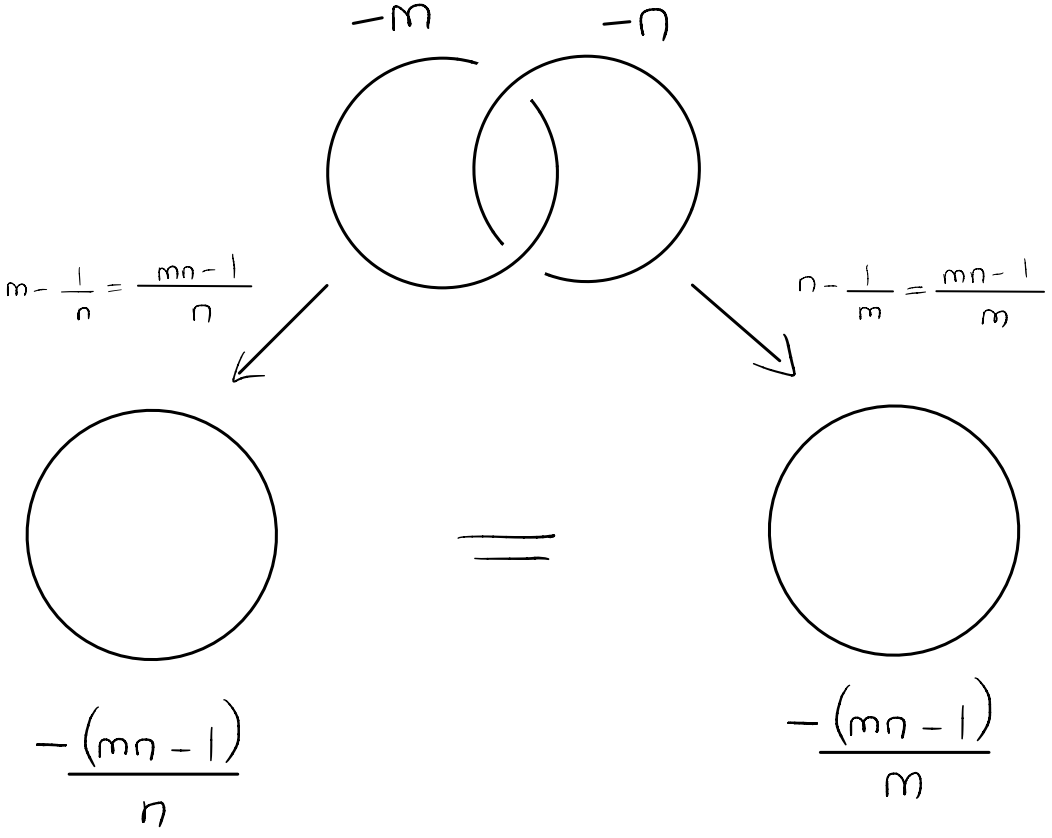
$$\mathbb{CP}^2 \# \overline{\mathbb{CP}}^2$$

$$\Rightarrow S^2 \tilde{\times} S^2 \cong \mathbb{CP}^2 \# \overline{\mathbb{CP}}^2$$

(2) Show that

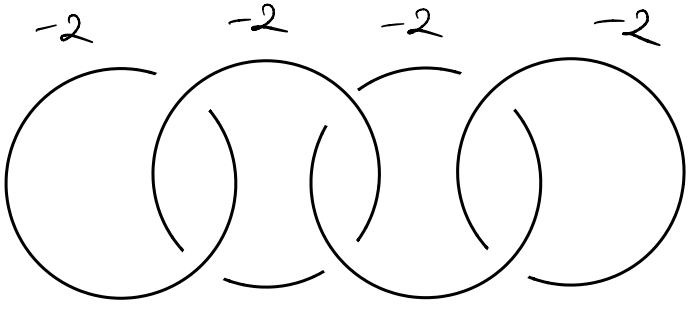
$$L(mn-1, m) \cong L(mn-1, n)$$

Solution:



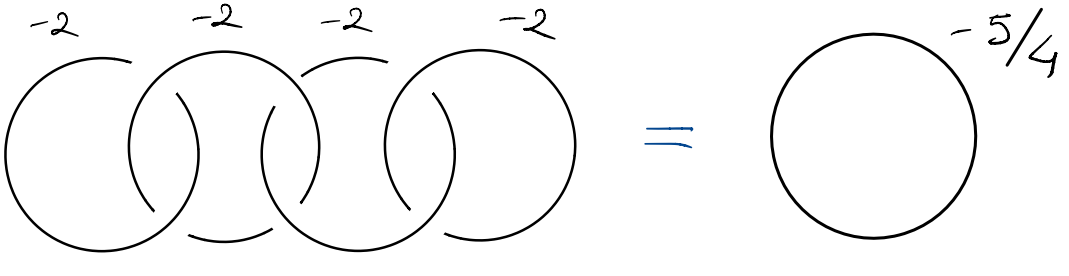
$$L(mn-1, n) \cong L(mn-1, m)$$

③ What manifold / surgery does the following diagram describe?

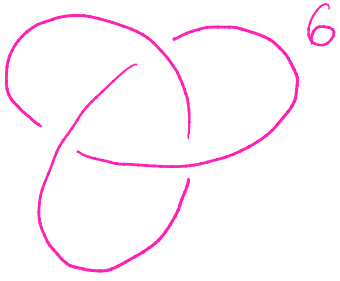


Solution:

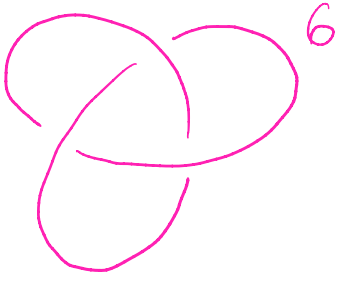
$$2 - \cfrac{1}{2 - \cfrac{1}{2 - \cfrac{1}{2}}} = \frac{5}{4}$$



4 What manifold / surgery does the following diagram describe?



Solution:



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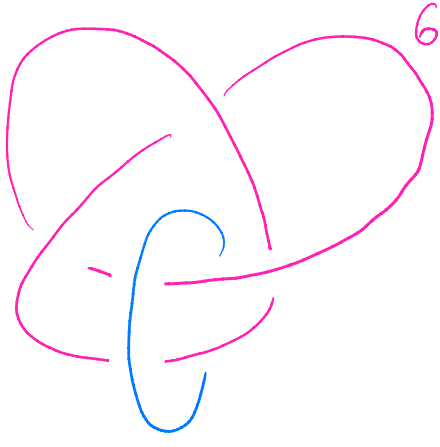
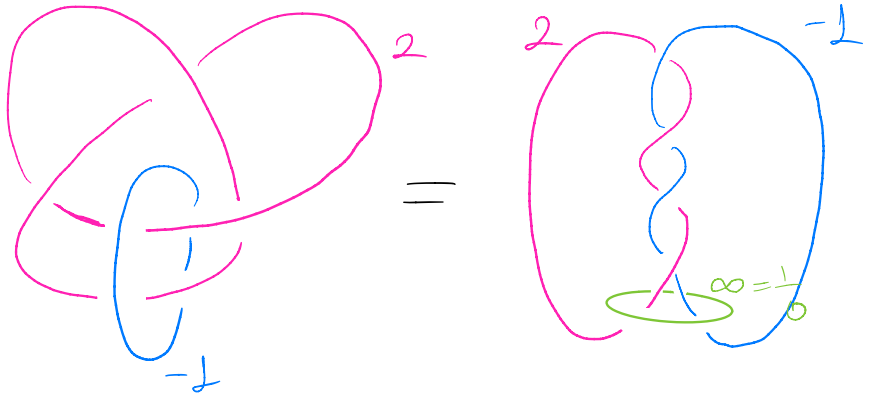
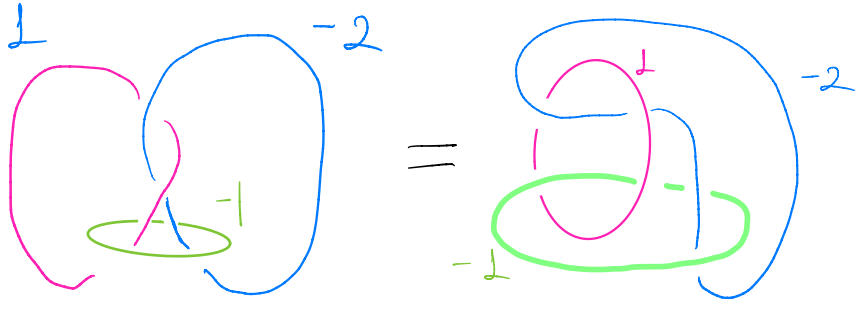


$\infty = 1/0$

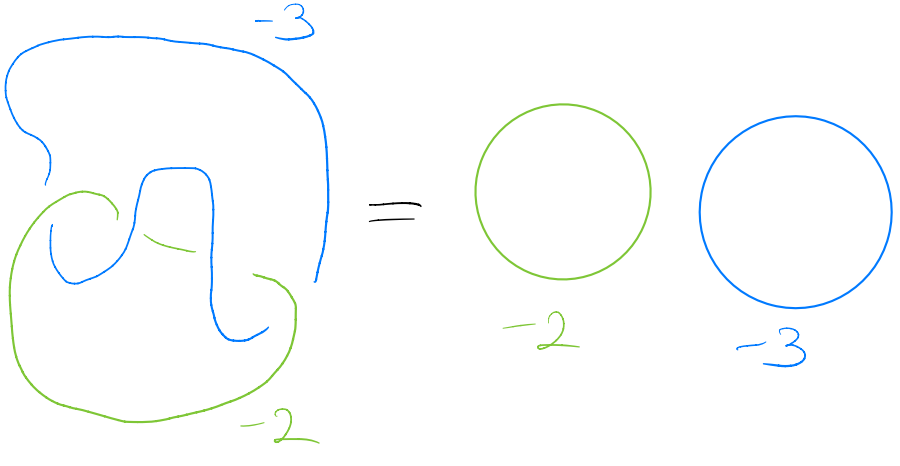
$\overset{RT}{\cong}$



$\overset{RT}{\cong}$



$\overset{RT}{\cong}$



$= L(2,1) \# L(3,1)$