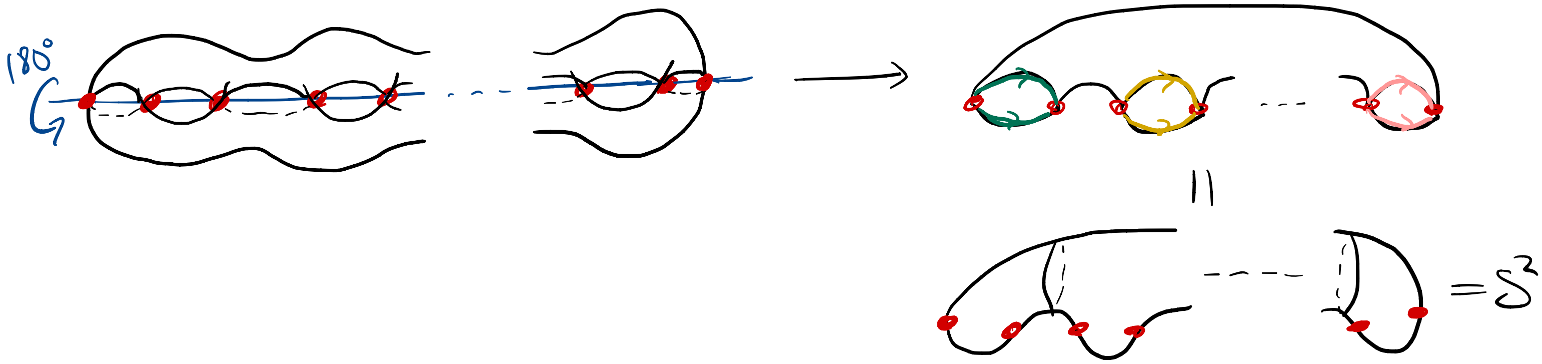
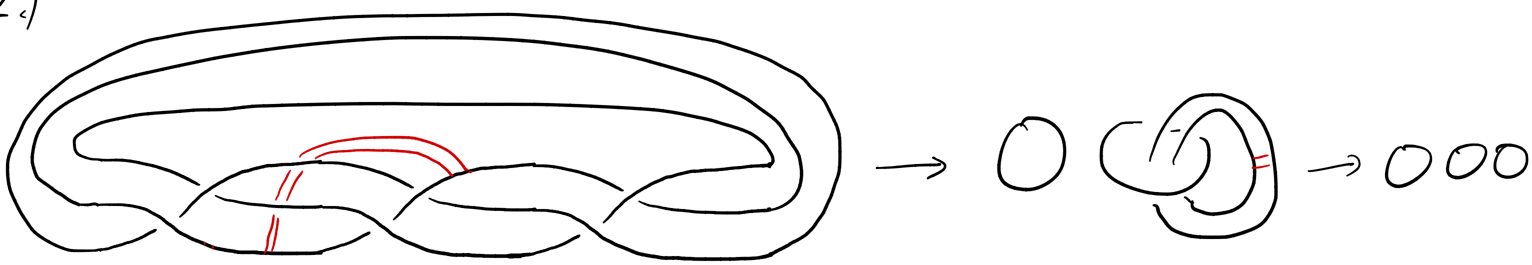
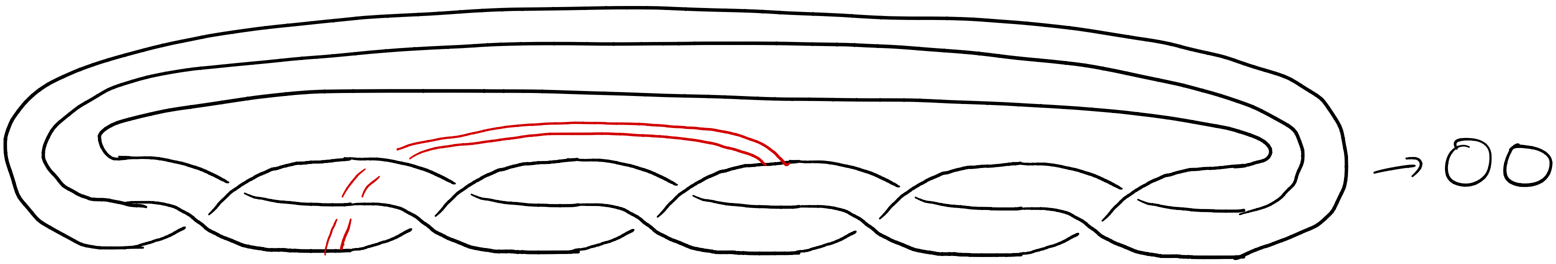
Solutions

1.) $\Sigma_2(S^3, 2n \text{ points}) = \Sigma_n$

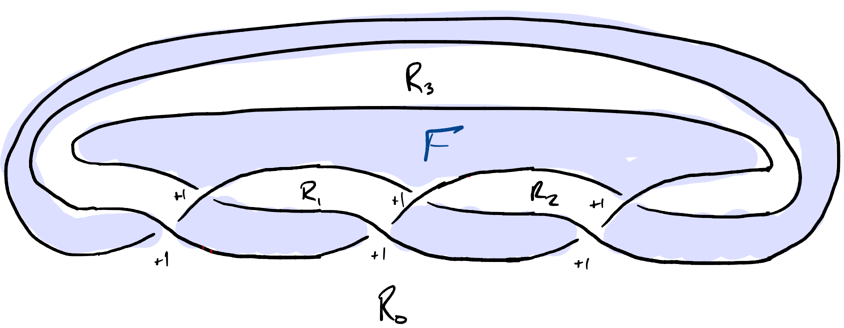


2.)





3.)



$$\Rightarrow G = \begin{bmatrix} 3 & -1 & -1 \\ -1 & 3 & -1 \\ -1 & -1 & 3 \end{bmatrix}$$

By the theory $\Sigma_2(S^3, L_3)$ bounds $X_3 := \Sigma_2(B^4, F)$ whose intersection form Q_3 can be represented by G. A similar argument holds for L_5.

4.) Yes.

For Q_3, $\varphi(f_1) = e_1 - e_2 - e_3$

$\varphi(f_2) = e_3 - e_1 - e_2$

$\varphi(f_3) = e_2 - e_3 - e_1$

For Q_5, $\varphi(f_1) = e_1 - e_2 - e_3$,

$\varphi(f_2) = e_3 - e_4 - e_5$

$\varphi(f_3) = e_5 - e_1 - e_2$

$\varphi(f_4) = e_2 - e_3 - e_4$

$\varphi(f_5) = e_4 - e_5 - e_1$