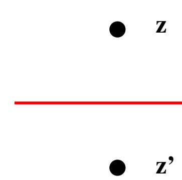
I repeate two exercises from Sheet 2 because they were about some material I did not cover in my second lecture.

Exercise 1. Let $(\Sigma, \boldsymbol{\alpha}, \boldsymbol{\beta}, z)$ be a pointed Heegaard diagram, $\mathbf{x}$ a Heegaard Floer generator, P a periodic domain and $[P] \in H_2(M; \mathbb{Z})$ the homology class associated to it. Prove that

$$c_1(\mathfrak{s}_z(\mathbf{x})) = e(P) + 2n_{\mathbf{x}}(P).$$

Exercise 2. Let $(\Sigma, \boldsymbol{\alpha}, \boldsymbol{\beta}, z)$ be a pointed Heegaard diagram and let z' be another basepoint separated by from z by the curve α_i.



Compute $\mathfrak{s}_z(\mathbf{x}) - \mathfrak{s}_{z'}(\mathbf{x})$ for a Heegaard Floer generator $\mathbf{x}$.

Exercise 3. Let $\mathbf{x}$ and $\mathbf{y}$ be Heegaard Floer generators. prove that

$$\mathfrak{s}_z(\mathbf{y}) - \mathfrak{s}_z(\mathbf{y}) = \epsilon(\mathbf{x}, \mathbf{y}).$$

Be careful with the next exercise because I couldn't solve it, but it should be doable.

Exercise 4. Choose (arbitrary) orientations of the α- and β- curves. Then to each intersection point x we assign $\sigma(x) = \pm 1$ depending on the sign of the intersection (since the sign depends on the order in dimension two, we fix the convention that α is first and β second). Given an a Heergaard Floer generator $\mathbf{x} = \{x_1, \ldots, x_n\}$ we define $\sigma(\mathbf{x}) = \prod \sigma(x_i)$.

Prove that, for every $u \in \mathcal{M}(\mathbf{x}, \mathbf{y})$, we have that $I(\mathcal{D}(u) \equiv 0 \pmod 2$ if $\sigma(\mathbf{x})\sigma(\mathbf{y}) = 1$ and $I(\mathcal{D}(u) \equiv 1 \pmod 2$ if $\sigma(\mathbf{x})\sigma(\mathbf{y}) = -1$.

Exercise 5. Let $(T^2, \alpha, \beta, \gamma, z)$ be the triple Heegaard diagram where, for some orientation of α, β and γ, $\alpha \cdot \beta = 1$ and $\gamma = \alpha + n\beta$ for $n \in \mathbb{Z}$. The placement of z is up to you. Compute the maps $F^-_{\alpha,\beta,\gamma}$.