Math 9100 Homework 2

Due Thursday, 2/27/25

1. Verify that the arcs α, β depicted in Figure 3.2 of Kassel–Turaev satisfy $\langle \alpha, \beta \rangle = 0$.

2. Exercise 3.2.1 in Kassel–Turaev.

3. Let $\theta_n = (\sigma_1 \cdots \sigma_{n-1})^n$ be a generator of the center of B_n. Prove that $\psi_n^r(\theta_n) = t^n I$.

Hint: This can be done in at least two distinct ways. A topological approach would be to use the fact that θ_n acts as a Dehn twist about a closed curve parallel to the boundary of the disk D, and to use the homological interpretation of ψ_n^r described in Remark 3.11. An algebraic approach would be to use Schur's lemma and the centrality of θ_n – but, then be careful with the hypotheses.