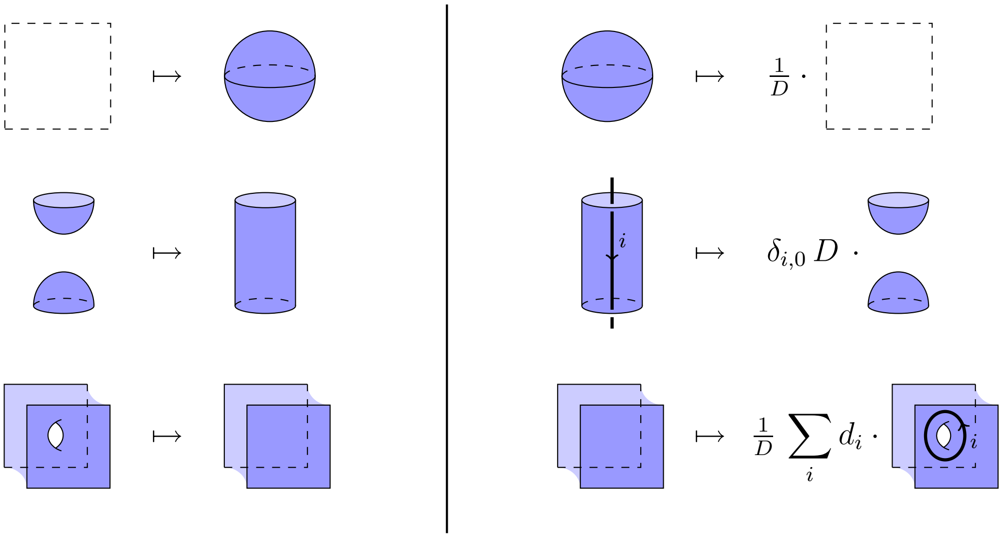
Let M be a 3-manifold that bounds a 4-manifold W. After replacing W by a cobordant manifold, $\exists$ a sumbersion $f : W \to \mathbb{R}$ s.t. $f|_M$ is Morse and each $f^{-1}(t)$ is a union of handlebodies; f has 6 types of critical points (the pictures below). To compute the invariant $Z(M) = Z(M, W)$, watch the movie $\{f^{-1}(t)\}_{t\in\mathbb{R}}$ (t is time) and do the operations below to the internal string diagrams. At the end of the movie, you have your number:



Here, $d_i = \bigcirc^{\,i}$ and $D^2 = \sum_i d_i^2$.

Example: the RT invariant of the 3-torus: