1. (a) Give a compactification of the space of descending flow lines $W^-(p)$ similar to the compactification we had of $\mathcal{M}(p,q)$.

(b) Use part (a) to define a map from the Morse complex to the singular chain complex. Show it is a chain map.

(c) Construct a map backwards and a chain homotopy to prove that $HM_*(M,f,g) = H_*(M)$. (See [H2, §3] if you get stuck.)

2. (a) Show that $\partial^2 = 0$ for combinatorial legendrian contact homology (CLCH).

(b) Show that CLCH is invariant under Reidemeister 2. Hint: algebraically mimic the birth-death invariance proof from Morse theory.

(c) Show that CLCH is invariant under Reidemeister 3 (of which there are two types depending on the cyclic order of the crossings). Hint: one does nothing and the other corresponds to a handleslide.

(d) What happens to CLCH under a stabilization?

3. (a) Prove that a generic homotopy $\Gamma = \{(f_t, g_t)\}$ between Morse-Smale pairs $\{(f_0, g_0)\}$ and $\{f_1, g_1\}$ satisfies the transversality claims we needed to define a chain map $\phi_T$. Repeat for a generic homotopy of homotopies (to define a chain homotopy).