1. Hatcher 3.3.17
2. Hatcher 3.3.20
3. Hatcher 3.3.21
4. Hatcher 3.3.24 [This example is particularly important in low-dimensional topology.]
5. Read Theorem 3.43 and do Hatcher 3.32 and 3.33.
6. Recall that a knot $K$ is a smooth embedding of $S^1$ into $S^3$. For a knot $K$, consider the manifold $X_K = S^3 - \nu(K)$ obtained by deleting a neighborhood of $K$, so that $X_K$ is a closed manifold with torus boundary.

(a) What is $H_*(X_K; \mathbb{Z})$? [Note: We computed $\pi_1$ of this manifold in the exercises to Chapter 1, but you don’t need that to do this computation.]

(b) The boundary torus of $X_K$ has two distinguished homology classes of curves $\mu$ and $\lambda$, defined as follows. The curve $\mu$ is a curve such that $\mu$ bounds a disk in $\nu(K)$ which intersects $K$ exactly once, and the curve $\lambda$ is the unique up to homotopy curve on the torus which intersects $\mu$ once and is unlinked with $K$. Let $H$ be a solid torus with $T$ its boundary torus, and let $S^3_{p/q}(K) = X_K \coprod_T H$ identified along a map which carries a meridional curve of $H$ on $T$ to a curve in the homology class $p\mu + q\lambda$ on $\partial X_K$. This is called the $p/q$ surgery on $K$. What is the homology of $S^3_{p/q}(K)$?