

TOPOLOGY 2 - HOMEWORK 7

(1) Hatcher, Section 1.3, Exercise 9.

(2) Hatcher, Section 1.3, Exercise 10.

(3) Hatcher, Section 1.3, Exercise 11. (**Hint:** mess with valence.)

(4) Hatcher, Section 1.3, Exercise 4.

Hint: Compute $\pi_1(X, x_0)$ in each case, where x_0 is an intersection point between S^2 and the diameter/circle, say. Let $p: \tilde{X} \rightarrow X$ be the universal cover, and note:

(a) Each $\tilde{x}_0 \in p^{-1}(x_0)$ determines a lift of the inclusion map $S^2 \rightarrow X$ to \tilde{X} (prove it!); and

(b) A lift of the diameter based at \tilde{x}_0 intersects the corresponding lift of S^2 only once (prove it!).

Check out examples 1.45 and 1.48 in the section for related results.

(5) Hatcher, Section 1.3, Exercise 16.