Exercises for the lecture course Algebraic Topology I – Sheet 5

University of Bonn, winter term 24/25

Aufgabe 17. Show that any metric space and any locally compact Hausdorff space is compactly generated.

Aufgabe 18. Prove or disprove:

(a) The composite of two cofibrations is again a cofibration;

(b) The product of two cofibrations is again a cofibration (i.e., if $f_1 \colon A_1 \to X_1$ and $f_2 \colon A_2 \to X_2$ are cofibrations, then $f_1 \times f_2 \colon A_1 \times A_2 \to X_1 \times X_2$ is a cofibration);

(c) A cofibration with non-empty domain is surjective if and only if it is a homeomorphism.

Aufgabe 19. Let (X, A) be a NDR. Prove or disprove that the canonical projection $p \colon X \to X/A$ is a homotopy equivalence if A is contractible.

Aufgabe 20. Consider closed subspaces A and B of X. Suppose that the inclusions $A \to X$, $B \to X$, and $A \cap B \to X$ are cofibrations.

Prove or disprove that the inclusion $A \cup B \to X$ is a cofibration.

[0] Hand-in Monday 11.11.