MA3408 Week 3

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January 24, 2022

Question 1.

Show that if $f = \mathrm{id}$ in the HELP theorem, then this recovers the homotopy extension property.

Question 2.

Use Whitehead's theorem to show that a CW complex is contractible if it is the union of an increasing sequence of sub-complexes $X_1 \subseteq X_2 \subseteq$ such that each inclusion $X_i \to X_{i+1}$ is null-homotopic.

Question 3.

Use cellular approximation to show that the n-skeletons of homotopy equivalent CW-complexes without cells of dimension $n + 1$ are also homotopy equivalent.

Question 4.

Let $f \colon X \to Y$ be a weak homotopy equivalence. Assuming X is a CW-complex, and Y has the homotopy type of a CW-complex, show that f is a homotopy equivalence.