

# MAT7064, Topics in Geometry and Topology

## Assignment 5

Due in-class on Friday, October 25

1. Given a cofibration  $i: A \hookrightarrow X$ , show that the inclusion  $X \hookrightarrow C_i$  is also a cofibration.
2. Suppose  $X$  is a CW complex whose top cells are in dimension  $d$ . Show that any map from  $X$  to a connective cover  $C_m X$  must be null-homotopic if  $m > d$ .
3. Similarly, show that there cannot be any map  $P_2 S^2 \rightarrow S^2$  from the Postnikov stage to  $S^2$  that induces an isomorphism on  $\pi_2$ .
4. Show that  $S^3 \times P_2 S^2$  has the same homotopy groups as  $S^2$ , but that the two cannot be homotopy equivalent.