Math 751
Equivariant Homotopy and Cohomology
Homework 2
Fall 2020

[You are not required to LaTex your homework (though it is preferred) . But if you would like to and are unsure how to produce Mackey functor diagrams, please consult the file MackeyDiagramsDemo.tex in Canvas.]

1. Describe explicitly the linearization map $A(K_4) \longrightarrow RO(K_4)$. (In contrast to the case of $G = C_2$, this is not an isomorpihsm).

2. Recall that if M and N are R-modules, then $\mathrm{Ext}_R(M, N)$ can be computed by finding a projective resolution P_* of M and then taking cohomology of the complex $\mathrm{Hom}_R(P_*, N)$. The same is true, more generally, in any abelian category.

   Use the projective resolution of $\underline{\mathbb{Z}} \in \mathbf{Mack}(C_2)$ described in the video in order to compute the groups $\mathrm{Ext}^*_{\mathbf{Mack}(C_2)}(\underline{\mathbb{Z}}, \underline{\mathbb{Z}})$

3. This problem will concern the group $C_6 \cong C_2 \times C_3$.

   (a) Work out the restriction and transfer maps in the projective Mackey functors $\underline{A}_{C_6}$ and $\uparrow_e^{C_6} \mathbb{Z}$. (You may find the Double Coset Formula for abelian groups, as in Corollary 1.49, useful here.)

   (b) Find a surjection $\underline{A}_{C_6} \longrightarrow \underline{\mathbb{Z}}$ and determine the kernel.

   (c) (Optional) Determine the induced Mackey functors $\uparrow_{C_3}^{C_6} \underline{\mathbb{Z}}$ and $\uparrow_{C_2}^{C_6} \underline{\mathbb{Z}}$ and find a surjection from the direct sum of these two induced Mackey functors to the kernel you found in part (b).