

Category Theory

Exercise Sheet 10

Exercise 1. Find examples of adjunctions from some of the other lectures which you are attending.

Exercise 2. Given categories C_1, C_2, C_3 and adjunctions $(F_1: C_1 \rightarrow C_2, G_1: C_2 \rightarrow C_1)$ and $(F_2: C_2 \rightarrow C_3, G_2: C_3 \rightarrow C_2)$, construct a natural adjunction $(F_2 \circ F_1, G_1 \circ G_2)$.

Exercise 3. Does the forgetful functor $\text{AbGrp} \rightarrow \text{Grp}$ admit a right adjoint?

Exercise 4. Find right and left adjoints to the functor from the category of small categories to the category of sets which sends a small category to its set of objects and a functor to the induced map on the sets of objects.