Category Theory
Homework Assignment VIII

For everyone: Read Chapter VI of Mac Lane and Chapter 5 of Riehl.

For Nick, Alessandra, Gregory: Present the problems below on November 20.

PROBLEMS

1. Let $\pm$Grp be the category of groups with $\pm$-morphisms. By a $+$-morphism, I mean an ordinary group homomorphism

$$f(xy) = f(x)f(y), f(x^{-1}) = f(x)^{-1}, f(e) = e,$$

while by a $-$-morphism I mean an antihomomorphism

$$f(xy) = f(y)f(x), f(x^{-1}) = f(x)^{-1}, f(e) = e.$$

A $\pm$-morphism is either a $+$-morphism or a $-$-morphism.

(a) Does $\pm$Grp have products? Equalizers?

(b) Does the forgetful functor $U\colon \pm\mathbf{Grp} \to \mathbf{Set}$ have a left adjoint?

2. Exercise VI.2.1 (a), (b), (c) of Mac Lane.

3. Exercise 5.2.iv of Riehl.