Category Theory
Homework Assignment VI

For everyone: Read 4.3 of Riehl and 4.3 of Mac Lane.

For Oscar, Khizar, Paige, Nate: Present the problems below on October 25.

PROBLEMS

1. Describe the unit and counit of the adjunction $(\Delta, \sqcap, \varphi)$ that defines products in $\mathcal{C} = $ Set:

$$\Delta \colon \mathcal{C} \to \mathcal{C} \times \mathcal{C} \colon A \mapsto (A, A); \qquad \sqcap \colon \mathcal{C} \times \mathcal{C} \to \mathcal{C} \colon (X, Y) \mapsto X \sqcap Y.$$

2. Let $\mathcal{C}$ be a category with small coproducts. Show that a functor $U \colon \mathcal{C} \to$ Set has a left adjoint if and only if U is representable.

3. Exercise 1.7.ii of Riehl.

4. Exercise 4.3.iii of Riehl.