Definition (Adjunction, Version 2)

Let **C** and **D** be categories. An *adjunction* from **C** to **D** is given by the following data, satisfying the following conditions.

Data:

1. A functor $L : \mathbf{C} \to \mathbf{D}$ (the *left adjoint*);

2. A functor $R : \mathbf{D} \to \mathbf{C}$ (the *right adjoint*);

3. Natural transformations $\mathrm{un} : \mathrm{Id}_{\mathbf{C}} \Rightarrow L \mathbin{\fatsemi} R$ and $\mathrm{co} : R \mathbin{\fatsemi} L \Rightarrow \mathrm{Id}_{\mathbf{D}}$

Conditions:

1. For all objects X of **C**, it holds that

$$L\mathrm{un}_X \mathbin{\fatsemi} \mathrm{co}_{LX} = \mathrm{Id}_{LX} \quad \text{and} \quad \mathrm{un}_{RY} \mathbin{\fatsemi} R\mathrm{co}_Y = \mathrm{Id}_{RY}$$

i.e. that the following diagrams commute:

The 2-morphisms un and co are called the *unit* and *counit* of the adjunction. An adjunction is called an *adjoint equivalence* if the unit and counit are natural isomorphisms.