

# 1 Definition of Sheaf

**Definition 1.1.** Let  $X$  be a topological space.  $\mathcal{F}$  is presheaf of abelian group if the following conditons are satisfied.

(1)

**Theorem 1.2.**

$$\Gamma(X, \mathcal{F}) \simeq \text{Hom}(\mathcal{O}_X, \mathcal{F}).$$

*Proof.* Define the following mapping:

$$\begin{array}{ccc} \text{Hom}(\mathcal{O}_X, \mathcal{F}) & \longrightarrow & \Gamma(X, \mathcal{F}) = \mathcal{F}(X) \\ \downarrow \Psi & & \downarrow \Psi \\ \varphi & \longmapsto & \varphi(1) \end{array} .$$

$$\begin{array}{ccc} \Gamma(X, \mathcal{F}) = \mathcal{F}(X) & \longrightarrow & \text{Hom}(\mathcal{O}_X, \mathcal{F}) \\ \downarrow \Psi & & \downarrow \Psi \\ s & \longmapsto & (f|_U \mapsto f|_U \cdot s|_U). \end{array}$$

These mappings are inverse of each other.

□