

\Rightarrow For each $x \in M$, \exists an open set $U_x \subset M$ s.t.
 $U_x \ni x$, and

there exists a section $\bar{f}_x \in \frac{M^*(U_x)}{\mathcal{O}^*(U_x)}$ s.t.

$$(\bar{f}_x)_p = \lim_{V \ni p} \bar{f}_x = f(p), \text{ where } V \ni p.$$

$\Rightarrow \{U_x\}_{x \in M}$ is an open covering of M . with

$$\bar{f}_x = f_x \mathcal{O}^*(U_x) \in \frac{M^*(U_x)}{\mathcal{O}^*(U_x)}, \text{ where } f_x \in M^*(U_x).$$

Suppose $U_x \cap U_y \neq \emptyset$. We want to show that

$$\frac{f_x}{f_y} \in \mathcal{O}^*(U_x \cap U_y).$$

For a fixed point $p \in U_x \cap U_y$, $(\bar{f}_x)_p = (\bar{f}_y)_p$

$$\Leftrightarrow \bar{f}_x|_{V_p} = \bar{f}_y|_{V_p} \Rightarrow f_x|_{V_p} \mathcal{O}^*(V_p) = f_y|_{V_p} \mathcal{O}^*(V_p)$$

$$\Leftrightarrow \frac{f_x|_{V_p}}{f_y|_{V_p}} \in \mathcal{O}^*(V_p).$$

Since $\{V_p\}_{p \in U_x \cap U_y}$ is an open covering of $U_x \cap U_y$, and

$$\frac{f_x}{f_y}|_{V_p \cap V_q} = \frac{f_x|_{V_p \cap V_q}}{f_y|_{V_p \cap V_q}} = \frac{f_x|_{V_q \cap V_p}}{f_y|_{V_q \cap V_p}} = \frac{f_x}{f_y}|_{V_q \cap V_p}.$$

$\frac{f_x}{f_y} \in \mathcal{O}^*(U_x \cap U_y)$ by the property (2) (p 35) of

the sheaf. \sqcup $\text{Ord}_{V_p}(f)$ is independent of p .