Definition 6.12. *[0B2]* *The* deleted neighbourhoods *(sometimes called* punctured neighbourhoods*) of points $x_0 \in \mathbb{R}$ are divided into three classes.*

- *Neighborhoods of $x_0 \in \mathbb{R}$, which contain a set of the type $(x_0 - \delta, x_0) \cup (x_0, x_0 + \delta)$ for a $\delta > 0$;*

- *right neighborhoods of $x_0 \in \mathbb{R}$, which contain a set of the type $(x_0, x_0 + \delta)$ for a $\delta > 0$;*

- *left neighborhoods of $x_0 \in \mathbb{R}$, which contain a set of the type $(x_0 - \delta, x_0)$ for a $\delta > 0$;*

In any case, the deleted neighborhoods must not contain the point x_0. The "full" neighborhoods are obtained by adding x_0. The "full neighborhoods" are the base for the standard topology on $\mathbb{R}$.

To the previous ones we then add the neighborhoods of $\pm\infty$:

- *neighborhoods of ∞, which contain a set of the type (y, ∞) as $y \in \mathbb{R}$ varies;*

- *neighborhoods of $-\infty$, which contain a set of the type $(-\infty, y)$ as $y \in \mathbb{R}$ varies;*

In this case we do not distinguish "deleted" neighborhoods and "full" neighborhoods.