

$$\lim_{x \rightarrow +\infty} f(x) = +\infty \Leftrightarrow \forall M \in R^+, \exists k \in R^+, x > k \Rightarrow f(x) > M;$$

$$\lim_{x \rightarrow +\infty} f(x) = -\infty \Leftrightarrow \forall M \in R^+, \exists k \in R^+, x > k \Rightarrow f(x) < -M;$$

$$\lim_{x \rightarrow -\infty} f(x) = +\infty \Leftrightarrow \forall M \in R^+, \exists k \in R^+, x < -k \Rightarrow f(x) > M;$$

$$\lim_{x \rightarrow -\infty} f(x) = -\infty \Leftrightarrow \forall M \in R^+, \exists k \in R^+, x < -k \Rightarrow f(x) < -M;$$

$$\lim_{x \rightarrow +\infty} f(x) = l \Leftrightarrow \forall \varepsilon > 0, \exists k > 0, x \in E, x > k \Rightarrow |f(x) - l| < \varepsilon;$$

$$\lim_{x \rightarrow -\infty} f(x) = l \Leftrightarrow \forall \varepsilon > 0, \exists k > 0, x \in E, x < -k \Rightarrow |f(x) - l| < \varepsilon;$$

$$\lim_{x \rightarrow x_0} f(x) = +\infty \Leftrightarrow \forall M \in R^+, \exists I_{x_0} (x \neq x_0) \Rightarrow f(x) > M;$$

$$\lim_{x \rightarrow x_0} f(x) = -\infty \Leftrightarrow \forall M \in R^+, \exists I_{x_0} (x \neq x_0) \Rightarrow f(x) < -M;$$

$$\lim_{x \rightarrow x_0} f(x) = l \Leftrightarrow \forall \varepsilon > 0, \exists I_{x_0}, x \in I_{x_0} (x \neq x_0) \Rightarrow |f(x) - l| < \varepsilon;$$