112. (a) If $\lim_{x \to c} |f(x)| = 0$, then $\lim_{x \to c} \left[-|f(x)|\right] = 0$.

$$-|f(x)| \le f(x) \le |f(x)|$$

$$\lim_{x \to c} \left[-|f(x)|\right] \le \lim_{x \to c} f(x) \le \lim_{x \to c} |f(x)|$$

$$0 \le \lim_{x \to c} f(x) \le 0$$

Therefore, $\lim_{x \to c} f(x) = 0$.

(b) Given $\lim_{x \to c} f(x) = L$:

For every $\varepsilon > 0$, there exists $\delta > 0$ such that $|f(x) - L| < \varepsilon$ whenever $0 < |x - c| < \delta$. Since $\left||f(x)| - |L|\right| \le |f(x) - L| < \varepsilon$ for $|x - c| < \delta$, then $\lim_{x \to c} |f(x)| = |L|$.