1. Let $f : I \rightarrow \mathbb{R}$ be continuous at $x_0 \in I$. Suppose that $f(x_0) > m$ for some $m \in \mathbb{R}$. Prove that there exists $\delta > 0$ such that $f(x) > m$ for all $x \in I$ with $|x - x_0| < \delta$.

2. Let $f_1$ and $f_2$ be two functions from $\mathbb{R}$ to $\mathbb{R}$. Suppose that $f_1$ and $f_2$ are both continuous at $x_0 \in \mathbb{R}$. Let $g(x) = \min\{f_1(x), f_2(x)\}$. Prove that $g(x)$ is continuous at $x_0$.

3. Let $f = \begin{cases} 2x + 3 & \text{for } x \geq 1 \\ -x + 5 & \text{for } x < 1 \end{cases}$. Prove that $f$ is continuous from the right for all $x \geq 1$ and that $f$ is discontinuous from the left at $x = 1$.

4. Let $f(x) = \frac{x^2 + 1}{\sqrt{x^2 - 1}}$. Determine the domain of this function and prove that $f$ is continuous for every point in its domain.