1. Define \( f : \mathbb{R}^2 \to \mathbb{R}^2 \) by
\[
f(x, y) = \frac{(x - 1)^2 \ln x}{(x - 1)^2 + y^2}, \quad (x, y) \neq (1, 0),
\]
and \( f(x, y) = A, \quad (x, y) = (1, 0) \). For what value of \( A \) is \( f \) continuous on \( \mathbb{R}^2 \)?

2. Find \( B \) such that
\[
f(x, y) = \frac{x^2 + y^2}{\exp(x^2 + y^2) - 1}, \quad (x, y) \neq (0, 0),
\]
and \( f(x, y) = B, \quad (x, y) = (0, 0) \) is continuous.

3. Let \( f : \mathbb{R}^n \to \mathbb{R} \) be defined by
\[
f(x) = \frac{\|x\|}{1 + \|x\|}.
\]
Show that \( f \) is continuous, has a minimum but no maximum.

4. Let \( f : \mathbb{R}^n \to \mathbb{R} \) be continuous and satisfies
(i) \( f(x) > 0 \) for all \( x \neq 0 \),
(ii) \( f(cx) = cf(x) \) for any \( x \) and \( c > 0 \).
Show that there exist \( a > 0 \) and \( b > 0 \) such that
\[
a \|x\| \leq f(x) \leq b \|x\|.
\]