1) Let \( x_1, x_2, \ldots, x_n \) be positive numbers, and let \( s = x_1 + x_2 + \cdots + x_n \).

Prove that
\[
(1 + x_1)(1 + x_2) \cdots (1 + x_n) \leq 1 + s + \frac{s^2}{2!} + \frac{s^3}{3!} + \cdots + \frac{s^n}{n!}.
\]

2) Let \( f : \mathbb{R} \to \mathbb{R} \) be a continuous function. For \( x \in \mathbb{R} \) we define
\[
g(x) = f(x) \int_0^x f(t) \, dt.
\]
Show that if \( g \) is a nonincreasing function, then \( f \) is identically equal to zero.

3) Prove that for any integer \( n \)
\[
\sqrt{2} \sqrt[4]{4} \sqrt[8]{8} \cdots \sqrt[2^n]{2^n} \leq n + 1.
\]

4) Find all integers \( n \) which are divisible by all integers not exceeding \( \sqrt{n} \).