1) Find all the solutions of the equation

\[1! + 2! + 3! + \cdots + n! = m^2,\]

for \( n, m \) positive integers.

2) Prove that the system of equations

\[
\begin{align*}
z_1 + 2z_2 + \cdots + nz_n &= 0, \\
z_1^2 + 2z_2^2 + \cdots + nz_n^2 &= 0, \\
\vdots & \quad \vdots \\
z_1^n + 2z_2^n + \cdots + nz_n^n &= 0,
\end{align*}
\]

has the unique solution \( z_1 = \cdots = z_n = 0 \) in complex numbers.

3) Prove the inequality \((1 + 1/2)(1 + 1/4)\cdots(1 + 1/2^n) < 3\), for every \( n \in \mathbb{N} \).

4) Define a sequence \( \{x_n\} \) by \( x_1 = 1/2, x_n = x_{n-1} - x_{n-1}^2 \). Show that \( \lim_{n \to \infty} nx_n = 1 \).

5) Let \( f \) and \( g \) be real periodic functions, defined on the real line. Assuming that

\[\lim_{x \to +\infty} (f(x) - g(x)) = 0,\]

prove that \( f(x) \equiv g(x) \).

6) The function \( f \) has a continuous derivative on \([0, \infty)\) which satisfies \( \int_0^\infty |f'(x)| \, dx < \infty \). Prove that the series \( \sum_{n=0}^\infty f(n) \) converges if and only if the integral \( \int_0^\infty f(x) \, dx \) converges.