1. (10 points) For which $b > 0$ is the following true: for any real number $a$ one can choose numbers $s_n = \pm 1$ so that

$$\sum_{n=1}^{\infty} \frac{s_n}{n^b} = a.$$
2. (10 points) Let \(a_n = (n^r + 1)^{1/m} - n^{r/m}, \ m \in \mathbb{Z}, \ m > 1.\) For which \(r > 0\) is the series \(\sum a_n\) convergent?
3. (10 points) Let $s > 0$, and the sequence $x_n$ be defined by the conditions:
\[ x_1 = 0, \quad x_{n+1} = \sqrt{x_n + s}. \]
Show that \( \{x_n\} \) converges and find its limit.
4. (10 points) Let \( f : \mathbb{R} \to \mathbb{R} \) be a continuous function, which is a 1-1 correspondence. Show that the function \( f^{-1} \) is continuous.
5. (10 points) Construct a continuous monotonely increasing function $f : [0, 1] \to [0, 1]$ which is constant in a neighborhood of every point not belonging to the Cantor set $C$, such that $f(0) = 0$ and $f(1) = 1$. 