1. Let A and B be two subsets of $\mathbb{R}$, which are both bounded below. Let $u = \inf(A)$ and $v = \inf(B)$. Find $\inf(C)$, in terms of u, v, when $C = \{ab : a \in A, b \in B\}$ and $A, B \subset [0, \infty)$,

2. Let $\{x_n\}_{n=1}^{\infty}$ be a sequence of real numbers that is not bounded. Then show that there is either a subsequence that diverges to ∞ or a subsequence that diverges to $-\infty$.

3. Decide if $\{x_n\}_{n=1}^{\infty}$converges or not when $x_n = \frac{n^\alpha}{(1+p)^n}$ with $\alpha \in \mathbb{R}, p > 0$.

4. Let $y_1, y_2 \in \mathbb{R}$ be given, and define recursively for $n \geq 1$,

$$y_{n+2} = \frac{1}{3}y_n + \frac{2}{3}y_{n+1}$$

for all $n \in \mathbb{N}$. Decide if y_n converges and if it does then find its limiting value.