Homework Assignment 3

Joshua Cragun *
Prof. Gordan Savin, MATH 3210

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*u1025691

Question 1

Let x_n be a sequence of positive real numbers such that $\lim_n x_n = x > 0$. Prove that

- $\lim_n x_n^2 = x^2$.
- $\lim_n \sqrt{x_n} = \sqrt{x}$.

Part 1: Using the identity

$$x_n x_n - xx = (x_n - x)^2 + 2x(x_n - x)$$

Where for any given $\varepsilon > 0$ there exists an integer N such that $|x_n - x| < \sqrt{\varepsilon}$. This implies that $|(x_n - x)^2| < \varepsilon$ and thus $\lim_{x\to\infty}(x_n - x)^2 = 0$

Question 2

Question 3

Question 4

Question 5

Question 6

Question 7