

Philadelphia University
Faculty of Science
Department of Basic Sciences and Mathematics
Real Analysis First Exam

Student name: _____

Number: _____

1) If $S = \left(1 - \frac{1}{n} : n \in \mathbb{N}\right)$,

a) Write the first 5 terms of S

b) Find $\inf S$ and $\sup S$.

2) Solve $|x^2 - 1| \leq 3$

3) Define ϵ - neighborhood of a .

4) State

a) Completeness property of \mathbb{R} .

b) Archimedean property.

5) Use the definition of the limit of a sequence to show that $\lim_{n \rightarrow \infty} \frac{n}{n^2+1} = 0$.

6) Prove that if $a \in \mathbb{R} \ni 0 \leq a < \epsilon \forall \epsilon > 0$, then $a = 0$.

7) Let S be a bounded set in \mathbb{R} , and S_0 is a nonempty subset of S . Show that $\sup S_0 \leq \sup S$