

PROBLEM SHEET E – Beyond the AP

1. Consider $\lim_{x \rightarrow -3^+} \frac{1}{x+3} = +\infty$
 - a. If $N = 40$, find δ .
 - b. If $N = 1000$, find δ .
2. Prove that $\lim_{x \rightarrow 6} \frac{1}{(x-6)^2} = +\infty$
3. Prove that $\lim_{x \rightarrow -5} \frac{-2}{(x+5)^2} = -\infty$
4. $\lim_{x \rightarrow 1} f(x) \neq -5$ where $f(x) = \begin{cases} x-5 & x \leq 1 \\ 3-8x & x > 1 \end{cases}$.
5. $\lim_{x \rightarrow 0} f(x) \neq -1$ where $f(x) = \begin{cases} x^2 & x \leq 0 \\ x-0.5 & x > 0 \end{cases}$.
6. Prove that $\lim_{x \rightarrow +\infty} \frac{2x-3}{x+2} = 2$

Answers

1. a. $\delta = .025$
2. Choose $\delta = \sqrt{\frac{1}{N}}$
4. Choose $\varepsilon = \frac{1}{2}$