

Homework # 24.

Read pp. 115 - 126.

Need to know: Definitions 4.2.1, 4.2.1(B),

Thm. 4.2.3, 4.2.4. Definition 4.3.1, Thm 4.3.2,

Corollary 4.3.3, Thm. 4.3.4.

Do the following problems:

1. a) Use only the definition 4.2.1 to prove that $\lim_{x \rightarrow 2} (x^2 + 4x - 9) = 3$.

b) Prove that $\lim_{x \rightarrow 0} \cos(\frac{1}{x})$ does not exist.

2. Let $f: A \rightarrow \mathbb{R}$, c is a limit point of A .

Suppose $\lim_{x \rightarrow c} f(x) = L$ and $L \neq 0$.

a) Prove that $\exists \delta > 0$ s.t. $|x - c| < \delta, x \in A \Rightarrow |f(x)| > \frac{L}{2}$.

b) Use only the definition 4.2.1 to prove that $\lim_{x \rightarrow c} \frac{1}{f(x)} = \frac{1}{L}$.

3. Do # 4.2.9, 4.3.1 (example 4.3.8 might help).