

1. Use ϵ, δ to prove from the definition of limit

$$(a) \lim_{x \rightarrow 2} x^3 + 2x^2 - x - 1 = 13$$

$$(b) \lim_{x \rightarrow 2^-} \frac{1}{x-2} = -\infty$$

$$(c) \lim_{x \rightarrow 2^+} \frac{1}{x-2} = +\infty$$

2. Prove that if $\lim_{x \rightarrow a^-} f(x) = L_1$ and $\lim_{x \rightarrow a^+} f(x) = L_2$ both exist but $L_1 \neq L_2$ then $\lim_{x \rightarrow a} f(x)$ does not exist.

3. Prove $\lim_{x \rightarrow a} f(x) = L \Rightarrow \lim_{x \rightarrow a} \sqrt{f(x)} = \sqrt{L}$ where $L > 0$.

4. Use mathematical induction to

prove
$$\lim_{x \rightarrow a} \sum_{i=1}^n f_i(x) = \sum_{i=1}^n \lim_{x \rightarrow a} f_i(x)$$