

Homework Assignment 2.

Assigned Sep 22, 2005

1. How would you define the following limits formally using ϵ and δ ?

a.

$$\lim_{x \rightarrow c^+} f(x) = L$$

b.

$$\lim_{x \rightarrow c} f(x) = \infty$$

c.

$$\lim_{x \rightarrow -\infty} f(x) = L$$

(Hint: 'As $x \rightarrow \infty$ ' can be written as 'there is a M such that for all $x > M$, ...')

2. Show (by using the ϵ , δ argument) that, $\lim_{x \rightarrow 0} \sin(\frac{1}{x})$ does not exist.
3. Show (by using the ϵ , δ argument) that, if $f(x)$ is continuous at $x = c$ and $g(y)$ is continuous at $y = f(c)$, then $g(f(x))$ is continuous at $x = c$.
- 4.

$$f(x) = \begin{cases} 1/2 & \text{if } x < 0 \\ 0 & \text{if } x \geq 0 \end{cases}$$

Show (by using the ϵ , δ argument) that, $f(x)$ is discontinuous at $x = 0$ continuous elsewhere.

5. Is the following statement true or false?

If the function $y = f(x)$ defined on $[a, b]$ takes any value between $f(a)$ and $f(b)$, then $f(x)$ is continuous on $[a, b]$.

6. Section 3.1: problems 35, 40, 49.
Section 3.2: problems 18, 22, 26, 28, 34, 38, 58, 68, 69.