

Homework Assignment for Week 03

1. Section 2.3: problems 35, 43, 49, 53.

2. Use the $\varepsilon - \delta$ argument to prove the following statement:

If $\lim_{x \rightarrow c} f(x) = L$ and $\lim_{x \rightarrow c} g(x) = M$, then $\lim_{x \rightarrow c} (4f(x) - 2g(x)) = 4L - 2M$.

Hint: Note that if $a < b$ then $-a > -b$.

3. Suppose that $f(x)$ is defined on $(c - a, c) \cup (c, c + a)$ for some $a > 0$. If $f(x)$ satisfies the following statement, then is it true that $\lim_{x \rightarrow c} f(x) = L$? Prove it if true, find a counter example if not true.

For any $\varepsilon > 0$ and any $\delta > 0$, there exists a number $x \in (c - \delta, c) \cup (c, c + \delta)$ such that $|f(x) - L| < \varepsilon$.