

Homework #9 Problems
MATH 4433 Introduction to Analysis

- 1.** Prove the Limit Location Theorem for functions: Suppose f is defined on an interval I containing the point P , except possibly at P itself, and suppose that $f(x) \leq M$ for all $x \in I \setminus P$. Prove that if $\lim_{x \rightarrow P} f(x) = L$, then $L \leq M$.

- 2.** Suppose the hypothesis above is changed to assume $f(x) < M$ for all x (strict inequality). Can you change the conclusion to be $L < M$? Either prove yes, or provide a counterexample to prove not.

- 3.** Prove the “sort of converse” of the above, sometimes called the Function Location Theorem: Suppose f is defined on an interval I containing the point P , except possibly at P itself, and let $\lim_{x \rightarrow P} f(x) = L$. If $L < M$, then for x sufficiently close to P , $f(x) < M$.