

MthT 430 Final Assessment 2001**Definitions**

1. Define $(\epsilon\text{-}\delta)$: $\lim_{x \rightarrow a} f(x) = L$.
2. Define: $\lim_{x \rightarrow a^-} f(x) = L$.
3. Define: The function f is continuous at a .
4. Define: The set of numbers A is bounded above.
5. Define: The number b is the *least upper bound* of a set of numbers A .

Proofs

11. Let f be defined on $[0, 1)$ be such that

- f is increasing on $[0, 1)$ (If $0 \leq x_1 < x_2 < 1$, then $f(x_1) < f(x_2)$.)
- f is bounded above on $[0, 1)$.

Prove that

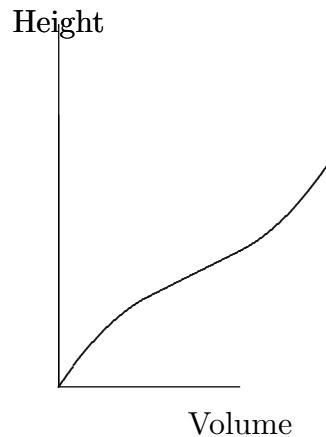
$$\lim_{x \rightarrow 1^-} f(x) = L$$

exists.

Qualitative Properties of Functions

12. Water drips very slowly into a circular bottle (beaker, flask) so that the graph of the Height (in cm) as a function of Volume (in cm^3) is shown below.

Figure-1



Draw a side view of the bottle. Carefully explain as many features as you can about the shape of the bottle and explain how they are related to the Height–Volume graph.

Essay

13. (Letter Grade: A - E) In the exam booklet, write an essay on a topic of your choice that is very relevant to the material considered in the course. Your essay should include at least one substantial example and at least one substantial theorem and its proof.