

Math 4590

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Problem 10: Show that if M is the set of all reciprocals of positive integers, then 0 is a limit point of M .

Proof.

From the definition of M , $M = \{1, \frac{1}{2}, \frac{1}{3}, \dots\}$.

As $n \rightarrow \infty$, the value approaches 0.

As 0 is the point in question, we know that for 0 to be a limit point, any open interval (a, b) which contains 0 must contain a point in M .

Any open interval containing 0 must have an endpoint b which is greater than 0.

Axiom 3 tells us that there is a point between 0 and b , which we will call c .

Since M approaches 0 and any interval containing 0 contains a point $c > 0$, all open intervals containing 0 contain a point of M .

\therefore By the definition of limit point, 0 is a limit point of M . ■