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intermediate value theorem

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1 Conway base 13 function

2 some case functions

f(x) = 1 for some x in q and 0 for ome x in Q

$$f(x) = \begin{cases} 1 & \text{if } x \in \mathbb{Q} \\ 0 & \text{if } x \notin \mathbb{Q} \end{cases}$$

is it continous? prove f not continous anywhere

Proof. discontinuous at x if $\exists \epsilon > 0$ such that $\forall \delta > 0$ there exists y such that $|x - y| < \delta$ and $|f(x) - f(y)| \geq \epsilon$ □