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4.1

Moderator: **helmut** [Moderator Control Panel]

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Author	Message

bribiescase **Post subject:** 4.1 **Posted:** Fri, 17 Apr 2020 09:03

offline

Math Cadet

Joined: Tue, 31 Mar 2020 15:10
Posts: 8

Let *f*: D⟶ R be continous.
Let $x_0 \in D$

So,
f is continuous at $x_0 \forall \varepsilon > 0 \exists \delta > 0 \ such \ that$
$0 < |x - x_0| < \delta \Rightarrow |f(x) - f(x_0)| < \delta$

by definition of a limit of a fuction, *f* has a limit at $x_0 \lim_{x \to x_0} f(x)$
now, for $x = x_0$, $|f(x) - f(x_0)| = |f(x_0) - f(x_0)| = 0 < \varepsilon$
so we can say that, $\forall \varepsilon > 0 \exists \ delta > 0 \ such \ that$

$0 < |x - x_0| < \delta \Rightarrow |f(x) - f(x_0)| < \varepsilon$
and by definition of continuity, *f* is continous at x_{0}.

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Abigail Chaidez **Post subject:** Re: 4.1 **Posted:** Fri, 17 Apr 2020 15:23

offline

Member

Joined: Tue, 31 Mar 2020 14:55
Posts: 15

> **bribiescase wrote:**
>
> Let *f*: D⟶ R be continous.
> Let $x_0 \in D$
>
> So,
> *f* is continuous at $x_0 \forall \varepsilon > 0 \exists \delta > 0 \ such \ that$
> $0 < |x - x_0| < \delta \Rightarrow |f(x) - f(x_0)| < \delta$
>
> by definition of a limit of a fuction, *f* has a limit at $x_0 \lim_{x \to x_0} f(x)$

now, for $x = x_0$, $|f(x) - f(x_0)| = |f(x_0) - f(x_0)| = 0 < \varepsilon$
so we can say that, $\forall \varepsilon > 0 \exists\ delta > 0\ such\ that$

$$0 < |x - x_0| < \delta \Rightarrow |f(x) - f(x_0)| < \varepsilon$$

and by definition of continuity, f is continous at x_{0}.

Since the question is stating that x_0 is continuous iff the limit f(x) =f(x_0) so then in order to prove this question you need to prove both directions.

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violeta guzman

offline

Member

Joined: Tue, 31 Mar 2020 15:36
Posts: 13

Post subject: Re: 4.1 **Posted:** Fri, 17 Apr 2020 15:30

I was looking at this question and saw that it mentions accumulation point but in the text in the beginning of the chapter, it says, "we do no longer require in the definition of continuity that x_0 is an accumulation point of D. Is this why it wasn't mentioned in your proof?

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helmut

online

Site Admin

Joined: Sat, 26 Apr 2003 15:14
Posts: 2266
Location: El Paso TX (USA)

Post subject: Re: 4.1 **Posted:** Sun, 19 Apr 2020 22:02

Violet:
Ex. 4.1 and 4.2 form a pair. 4.1 tells you something if x_0 is an accumulation point of D, 4.2 tells you what happens when x_0 is not an accumulation point of D.

____
The greater danger for most of us lies not in setting our aim too high and falling short; but in setting our aim too low, and achieving our mark. - Michelangelo Buonarroti

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helmut

online

Site Admin

Joined: Sat, 26 Apr 2003

Post subject: Re: 4.1 **Posted:** Sun, 19 Apr 2020 22:02

Estefany:
Your proof needs minor changes: Isn't this an "iff" statement?

____
The greater danger for most of us lies not in setting our aim too high and falling short; but in setting our aim too low, and achieving our mark. - Michelangelo Buonarroti

15:14
Posts: 2266
Location: El Paso TX (USA)

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Jocelyne Perez **Post subject:** Re: 4.1 **Posted:** Thu, 23 Apr 2020 17:49

offline

Member

Joined: Tue, 31 Mar 2020 15:27
Posts: 15

i think what you need to change is

Hence, it is continuous at x_0 iff $\lim_{x\to x_0} f(x) = f(x_0)$

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bribiescase **Post subject:** Re: 4.1 **Posted:** Sun, 03 May 2020 10:57

offline

Math Cadet

Joined: Tue, 31 Mar 2020 15:10
Posts: 8

How I see this being an iff statement is,

$\Rightarrow$

Let *f*: D$\longrightarrow$R be continous.
Let $x_0 \in D$

So,
f is continuous at x_0 $\forall \varepsilon > 0 \exists \delta > 0 \ such \ that$
$0 < |x - x_0| < \delta \Rightarrow |f(x) - f(x_0)| < \varepsilon$

by definition of a limit of a fuction, *f* has a limit at x_0 $\lim_{x\to x_0} f(x)$

now, $\Leftarrow$

Let $\lim_{x\to x_0} f(x)$

$\forall \varepsilon > 0 \exists \delta > 0 \ such \ that$
$0 < |x - x_0| < \delta \Rightarrow |f(x) - f(x_0)| < \varepsilon$

for $x = x_0, |f(x) - f(x_0)| = |f(x_0) - f(x_0)| = 0 < \varepsilon$
so we can say that,$\forall \varepsilon > 0 \exists \delta > 0 \ such \ that$

$|x - x_0| < \delta \Rightarrow |f(x) - f(x_0)| < \varepsilon$
and by definition of continuity, *f* is continous at x_{0}.[/quote]

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helmut **Post subject:** Re: 4.1 **Posted:** Sun, 03 May 2020 12:53

online

Site Admin

Nice. One credit to Estefany.

The greater danger for most of us lies not in setting our aim too high and falling short; but in setting our aim too low, and achieving our mark. - Michelangelo Buonarroti

Joined: Sat, 26 Apr 2003 15:14
Posts: 2266
Location: El Paso TX (USA)

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