S.O.S. Mathematics CyberBoard

Your Resource for mathematics help on the web!

3.8

Moderator: helmut [Moderator Control Panel]

Author	Message

oula-khouzam

offline

Member

Joined: Tue, 31 Mar 2020 17:23
Posts: 12

Post subject: 3.8 **Posted:** Mon, 06 Apr 2020 11:00

Assume f(x) has a lim at x0 and assume the limit is L .
Now by the limit def.:
$\forall\epsilon > 0, \exists\delta > 0\ such\ that\ |f(x) - L| < \epsilon\ whenever\ x \in D\ and\ |x - xo| < \delta$

a) let us start from $x \in D\ and\ |x - xo| < \delta$:
this is the same as saying that : $xo - \delta < x < xo + \delta\ and\ x \in D$
which is the same as saying that $x \in (x0 - \delta\ ,\ x0 + \delta) \cap D$

b) Now back to the first part where: $|f(x) - L| < \epsilon$:
it is equivalent to $|f(x) - L| + |L| < \epsilon + |L|$
from (1.7) we all know that: $|f(x) - L + L| \leq |f(x) - L| + |L| < \epsilon + |L|$
so $|f(x)| < \epsilon + |L|$

c) now assume that $M = \epsilon + |L|$ which is >0

from a, b and c
the statement :
|f (x)| ≤ M for all x ∈ (x0 − δ, x0 + δ) ∩ D
is true.

helmut

online

Site Admin

Joined: Sat, 26 Apr 2003

Post subject: Re: 3.8 **Posted:** Tue, 07 Apr 2020 14:31

> **oula-khouzam wrote:**
> $\forall\epsilon > 0, \exists\delta > 0\ such\ that\ |f(x) - L| < \epsilon\ whenever\ x \in D\ and\ |x - xo| < \delta$

Don't you know that only when $x \neq x_0$?

15:14
Posts: 2237
Location: El Paso TX (USA)

____
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

Top profile pm email edit quote

oula-khouzam **Post subject:** Re: 3.8 **Posted:** Tue, 07 Apr 2020 16:06

offline
Member

Joined: Tue, 31 Mar 2020 17:23
Posts: 12

yeah you are right Dr.
so for the case x=xo
can we choose M to be the Max of {ϵ+|L|, |f(xo)|}?

Top profile pm email edit quote

helmut **Post subject:** Re: 3.8 **Posted:** Tue, 07 Apr 2020 16:31

online
Site Admin

Joined: Sat, 26 Apr 2003 15:14
Posts: 2237
Location: El Paso TX (USA)

Yes. Please write it up again.

____
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

Top profile pm email edit quote

oula-khouzam **Post subject:** Re: 3.8 **Posted:** Tue, 07 Apr 2020 16:56

offline
Member

Joined: Tue, 31 Mar 2020 17:23
Posts: 12

Assume f(x) has a lim at x0 and assume the limit is L .
Now by the limit def.:
$\forall \epsilon > 0, \exists \delta > 0 \; such\ that \; |f(x) - L| < \epsilon \; whenever \; x \in D \; and \; |x - x_0| < \delta$
and $x \neq x_0$

a) let us start from $x \in D \; and \; |x - x_0| < \delta$:
this is the same as saying that :$x_0 - \delta < x < x_0 + \delta$ and $x \in D \backslash \{x_0\}$
which is the same as saying that x$\in$ $(x0 - \delta \; , \; x_0 + \delta) \cap D \backslash \{x_0\}$

b) Now back to the first part where: $|f(x) - L| < \epsilon$:
it is equivalent to $|f(x) - L| + |L| < \epsilon + |L|$
from (1.7) we all know that: $|f(x) - L + L| \leq |f(x) - L| + |L| < \epsilon + |L|$
so $|f(x)| < \epsilon + |L|$

c) now assume that M=Max{ϵ+|L|, |f(x0)|} which is >0
Not: in case $x = x_0, f(x) = f(x_0)$

from a, b and c
the statement :
|f (x)| ≤ M for all x ∈ (x0 − δ, x0 + δ) ∩ D
is true.

Top profile pm email edit quote

violeta guzman

offline

Math Cadet

Joined: Tue, 31 Mar 2020 15:36
Posts: 8

Post subject: Re: 3.8

Posted: Thu, 09 Apr 2020 17:31

Hi Oula!
I just had a quick question. in part a, how did you go
from
"this is the same as saying that : $xo - \delta < x < xo + \delta \; and \; x \in D$"
to
"which is the same as saying that $x \in (x0 - \delta \;,\; x0 + \delta) \cap D$"

Top profile pm email edit quote

Abigail Chaidez

offline

S.O.S. Newbie

Joined: Tue, 31 Mar 2020 14:55
Posts: 4

Post subject: Re: 3.8

Posted: Thu, 09 Apr 2020 18:10

a) let us start from $x \in D \; and \; |x - x_0| < \delta$:
this is the same as saying that :$x_0 - \delta < x < x_0 + \delta$ and $x \in D \setminus \{x_0\}$

Hi Oula,
I want to know why you are able to isolate for x without changing the original statement?

Top profile pm email edit quote

oula-khouzam

offline

Member

Joined: Tue, 31 Mar 2020 17:23
Posts: 12

Post subject: Re: 3.8

Posted: Fri, 10 Apr 2020 22:08

Hi Abigail,
$|x - x_0| < \delta <=> -\delta < x - x_0 < +\delta$
add x_0 to all sides =>$x_0 - \delta < x - x_0 + x_0 < x_0 + \delta$
<=>$x_0 - \delta < x < x_0 + \delta$
that makes $x \in (x_0 - \delta, x_0 + \delta)$

Top profile pm email edit quote

oula-khouzam

offline

Member

Joined: Tue, 31 Mar 2020 17:23
Posts: 12

Post subject: Re: 3.8

Posted: Fri, 10 Apr 2020 22:24

Hi Violeta,

starting by $x \in D$ and $|x - x_0| < \delta$ and $x \neq x_0$

lead us to say the x should be $\in (x_0 - \delta, x_0 + \delta)$ and x should be $\in D$ and $x \neq x_0$

that means that x is in the intersection of these three sets =>$x \in (x_0 - \delta, x_0 + \delta) \cap D$ and $x \neq x_0$

Top

profile pm email edit quote

oula-khouzam

Post subject: Re: 3.8

Posted: Fri, 10 Apr 2020 22:25

offline

Member

Joined: Tue, 31 Mar 2020 17:23
Posts: 12

Hope that I answered your equations Violeta and Abigail. if not please let me know

Top

profile pm email edit quote

helmut

Post subject: Re: 3.8

Posted: Mon, 13 Apr 2020 12:30

online

Site Admin

Joined: Sat, 26 Apr 2003 15:14
Posts: 2237
Location: El Paso TX (USA)

Done. Credit to Oula.

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

Top

profile pm email edit quote

Display posts from previous: All posts Sort by Post time Ascending Go

new topic locked **Page 1 of 1** [11 posts]

Board index » Math 3341 » Chapter 3

All times are UTC - 6 hours

Who is online

Users browsing this forum: **helmut**

Quick-mod tools: Unlock topic Go

You **can** post new topics in this forum
You **can** reply to topics in this forum
You **can** edit your posts in this forum
You **can** delete your posts in this forum

Search for: Go

Jump to: Chapter 3 Go

[Administration Control Panel]

Contact Us | S.O.S. Mathematics Homepage
Privacy Statement | Search the "old" CyberBoard
734 users online during the last hour