

# Re: Increasing and decreasing functions – conflicting authors

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In article <jcGdnSJMRYDhp\_TZRVn-iA@xxxxxxxxxxxx>, Colleyville Alan <nospam@xxxxxxxxxxxx> wrote:

I am starting to read Stewart's Calculus Early Transcendentals (1999 ed.) for a Calc I class that will begin in a few weeks. In it he talks about increasing and decreasing functions and shows the intervals using closed interval notation. In my College Algebra text (Beecher, Penna, & Bittinger), they emphatically state that you need to use open interval notation when discussing increasing, decreasing, or constant intervals as it is impossible for a point to be increasing and decreasing at the same time.

Okay. First, it is not the  $\rightarrow$ point $\leftarrow$  that is increasing or decreasing. It is the function which is decreasing.

Second: there is this thing called "convention". For some authors, for example, a function  $f$  is "increasing" on an interval if and only if for all  $x, y$  in the interval, if  $x < y$  then  $f(x) < f(y)$ ; for others, you only require  $f(x) \leq f(y)$ , and for the strict inequality you say "strictly increasing". They are both 'correct' in that there is no universally agreed upon meaning, and so care must be given to specify what you mean. There are other definitions.

In fact, under some definitions it would make sense to say a function is increasing or decreasing at a  $\rightarrow$ point $\leftarrow$ , while in others it would not make sense.

In short: it is just a matter of preference. As long as the author is clear and explicit on his or her preference, and the use is consistent throughout the text, it is fine.

In the Algebra text they show a function that was increasing in the interval  $(3, 5)$  and decreasing over the interval  $(5, \infty)$ . Stewart shows a similar situation. I do not have the book before me, but the gist of it is a function that is increasing  $[3, 5]$  and decreasing on  $[5, \infty]$ .

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I suspect it is Stewart that is wrong here, but I am not sure.

He is not wrong. He is simply using a different convention.

Can anyone  
give me a definite answer as to whether such intervals need to be open or  
closed?

There is no definite answer: it will depend on which definitions you  
are using. Pick the one that will be used in your course and use that  
one.

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"It's not denial. I'm just very selective about  
what I accept as reality."

—— Calvin ("Calvin and Hobbes")  
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