question 2 views

Daily Challenge 7.1

(**Due Thursday 6/7 at 11:59 pm Eastern**)

We should probably resume daily challenges today, and talk on Slack at some point about the due date for catching up (and when to hold make-up sessions).

For today, let's revisit an old daily challenge and fix it up so it's fit to be included in a consolidation document. The question was

- Suppose f is a strictly increasing function. Show that f passes the horizontal line test.

The original response was

- The function f passes the horizontal line test because one can solve for every x value of the graph given a corresponding y value, with no duplicate y values.

As it stands, this solution doesn't clearly explain how the notion of strictly increasing relates to the horizontal line test -- it's really a restatement of what the horizontal line test does.

Read the instructor's response to daily challenge 5.6, then re-submit a solution to the above question. It may help to

1. Keep in mind the assumptions and conclusions of the argument. We assume that f is a strictly increasing function and conclude that f passes the horizontal line test.
2. The definition of *strictly increasing function* requires that, whenever $a > b$, we have $f(a) > f(b)$.
3. The definition of *horizontal line test* is given on page 18 of the text (i.e. page 6 of RA 2), i.e. a function f passes the horizontal line test if every line $y = b$ for $b \in \mathbb{R}$ intersects the graph of f in at most one point.

   To understand this, we also need the definition of *graph* of f, which is given on the preceding page: the *graph* of a real-valued function f is the set $\{(x, f(x)) \mid x \in \mathrm{Dom}(f)\}$.

   Combining these definitions, we see that f passes the horizontal line test if $f(a) \neq f(b)$ whenever $a \neq b$ for $a, b \in \mathrm{Dom}(f)$.

daily_challenge

Updated 10 months ago by Christian Ferko

the students' answer, *where students collectively construct a single answer*

Logan Pachulski:
First, I would like to give the definition of a strictly increasing: "A function f is strictly increasing if, whenever $x > y$ we have $f(x) > f(y)$". Fortunately, this definition gives us the base of our argument. Assume without loss of generality that f is a strictly increasing function, with the other option being strictly decreasing. If the function is neither of those, then there at least two unique points now defined as x and y. Since $x \not< y$ and in turn $f(x) \not< f(y)$, then a function that is not a a strictly increasing function(once again, also assume this applies to strictly decreasing) does not pass the horizontal line test. I believe I have appropriately applied inverse statements here, and therefore a function that is strictly increasing passes the horizontal line test. $\square$

(I probably should have looked at the instructor answer LOL)

Updated 10 months ago by Logan Pachulski

the instructors' answer, *where instructors collectively construct a single answer*

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followup discussions *for lingering questions and comments*