Resolved Unresolved @31_f6

Actions

Nandini Bhat 2 months ago

I thought about d) like this:

Graph Bill and Samantha's progress, with time on the x-axis and speed on the y-axis. Let's say that for half of the journey, Bill has been traveling at a faster speed than Samantha. If Samantha is going to cover the same distance in the same amount of time as Bill, she will have to match his speed at some point during the remainder of the journey. This is because $distance = speed \times time$- if Samantha's speed remains below Bill's at all time points of the journey, it will mean she has covered less distance by 2pm. Therefore, the statement that their speeds have to be the same at at least one point is true.

I made a very rough graph sketch to try and picture this, and it did the trick- visualizing it helped more than trying out any proper calculations. This problem also reminded me of the Monk Problem: https://math.stackexchange.com/questions/2903564/a-monk-is-climbing-a-hill .

~ An instructor (Elisabeth stade) thinks this is a good comment ~

helpful! | 2

Reply to this followup discussion

Resolved Unresolved @25_f3

Actions

Nandini Bhat 2 months ago

(Note: This is for #15). The last section in chapter 3.3 (on local linearity and multipliers) helped me out here. We know that $f(a) = b$, and that $f'(a) = -3$. We also know that k is a small increment or decrement in a. This suggests that if we were to zoom in on the points where $x = a - k$, $x = a$, and $x = a + k$, we would see a straight line- therefore, $f(a)$ would be a linear function when $x = a$ (it is locally linear).

By asking us the best estimate of $f(a + k)$, the question is basically asking us what b is when $x = a + k$. To find out, we can use the microscope equation:
$\Delta b \approx f'(a) \cdot \Delta x$

We know $f'(a) = -3$ from the information we have. We also know that the change in a right now is $+k$ (it is positive as we are being asked to estimate $f(a + k)$. So we get:
$\Delta b \approx -3 \cdot k$
$\approx -3k$

Now that we have the change in b, we just have to add it to our current b.
$b \approx b + (-3k)$
$\approx b - 3k$

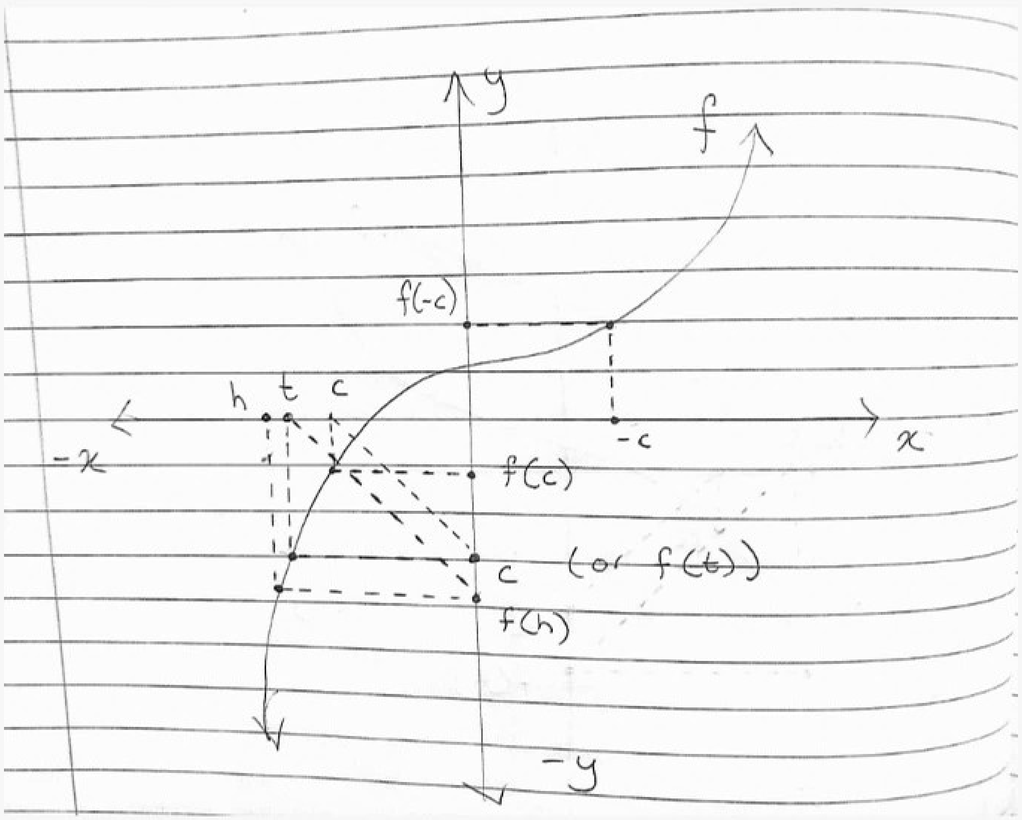
helpful! | 0

Resolved Unresolved @44_f3

Actions

Nandini Bhat 2 months ago

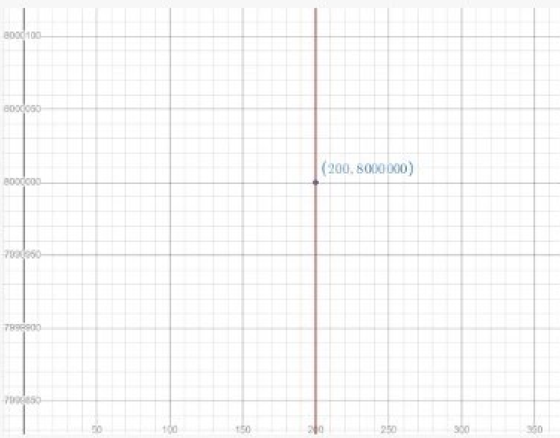
Just saw this and decided to give it a shot. Since we know where c is, and c = f(t), we know that c is the y value for (t, f(t)). I've drawn a dotted line from c to the function line. The x value of that coordinate should be t.



Resolved Unresolved @30_f3

Nandini Bhat 2 months ago

Part c) was really interesting. I plotted the function on Desmos and had to zoom in (and scroll up) really far to find (200, f(200)). The line at this point really looked vertical, so I answered the first part of the question by stating that the slope when x = 200 must be infinity.



However, when I used code to calculate the quotients, I actually got a slope value of around 120000. If the line were truly vertical, the rate of change in x should've been 0; dividing by the change in x would then result in an undefined value, or infinity. I guess this means that the line at this point isn't truly vertical, and just appears that way to the naked eye?

helpful! 0