1.20

Wednesday, January 20, 2021 7:57 PM

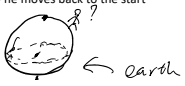
Welcome to TUT0102C
We will start at 8:10.
I am going to answer your questions, so please come with some questions prepared.
You are encouraged but not mandatory to open the mic and camera.

I will answer general questions first and make breakout rooms to let you discuss with each other.

Here is an old question, think about it and I will give the answer at the end of the tutorial.

1. An Old Question:

A man on the earth moves toward south 10km, then east 10km, then north 10km. Finally he moves back to the start position. Where is this start position on the earth?

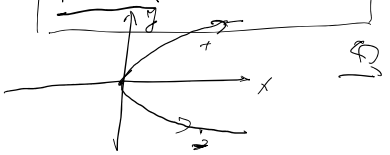


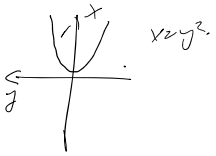
2. If $f(x) = \cfrac{x}{x+\cfrac{x}{x+\cfrac{x}{x+\ddots}}}$, find $f'(x)$*

Q1.

1. $x = x$

$y^2 = x \iff y = \pm\sqrt{x}$





$x = y^2$.

$\sqrt{x^2} = \sqrt{t} \quad t = x^2$

$f : \mathbb{R} \to \mathbb{R}$
$x \mapsto f(x)$

$\sqrt{\alpha^2} \Rightarrow$ positive

$|x|$

Q2. $f(x) = \cfrac{x}{x+\cfrac{x}{x+\cfrac{x}{x+\ddots}}}$, $f'(x)$

$f(x) = \cfrac{x}{x+f(x)}$, WTS $f'(x)$

$x > 0$.

Self-Similarity

$y = \cfrac{x}{x+y}$, $y' = \frac{dy}{dx}$.

$x' = f(x)$

dynamic system.

(1) $xy + y^2 = x \Rightarrow y^2 + xy - x = 0$.

$y' = \frac{dy}{dx}$

$\frac{d}{dx}(y^2 + xy - x) = 0$.

$2yy' + (y + xy') - 1 = 0$.

$$2yy' + (y + xy') - 1 = 0$$

$$(2y + x)y' + y - 1 = 0$$

$$\boxed{y' = \frac{1-y}{2y+x}}$$

$$y = \frac{x}{x+y} \qquad y^2 + xy - x = 0$$

$$1 - y = \frac{y}{x+y} \qquad \Rightarrow y = \frac{-x \pm \sqrt{x^2+4x}}{2} \qquad y = \frac{-x + \sqrt{x^2+4x}}{2},$$

$$y' = \frac{1 - \frac{-x + \sqrt{x^2+4x}}{2}}{-x + \sqrt{x^2+4x} + x} =$$

$$= \frac{(2 + x - \sqrt{x^2+4x})(\sqrt{x^2+4x})}{2(x^2+4x)}$$

Q1.

IS,10 → E,10 , N,10

$C_0, C_1, \cdots, C_n \cdots$ are solutions

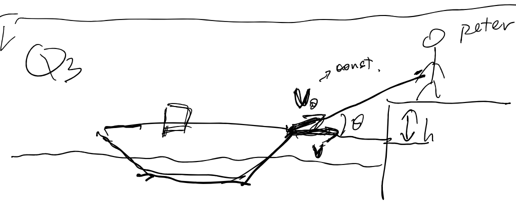
why?

Why unit doesn't matter?

how the unit affect results?

{The method of similarity}

Q3



question? how this boat move?

constant? accelerating? $v = v_0 \cdot \cos\theta$?