

Rate of change

Velocity Problem

$t \longrightarrow t = a$

Tangent line

I R G

I V

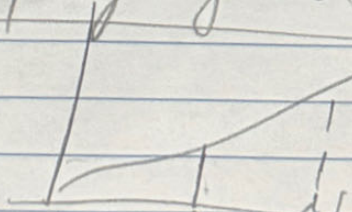
$$h(x) = \frac{f(x) - f(a)}{x - a}$$

Same problem

\forall problem choose value $x = a$

\rightarrow choose $x_2 \rightarrow$ plug ^{into} $h(x)$

can't do this \uparrow



think of \forall problem as $a+h$

plug $a+h$ into $h(a+h) = f(a+h) - f(a)$

$$V(t) = t^3 - 6t^2 + 35 \quad a = 5$$

$$A.R.C = h(x) = \frac{V(t) - V(5)}{t - 5}$$

$\downarrow \quad \downarrow \quad \downarrow$
 Average Rate Change

$$= \frac{t^3 - 6t^2 + 25}{t - 5}$$

find [Start, Rate change]
 plug $x \rightarrow a$ } plug into $f(x)$
 $x \rightarrow a$

→ table AVR of $h(x) \rightarrow 15$
 → instantaneous rate of change = 15

Velocity problem

Δ calculus unique problem // this can
 C Rate of change

in V. Problem given $f(t)$
 give pos ab) at $t \Rightarrow$ I.V of ab) \approx
 'A.V.R

$$A.V. = A.V.R = \frac{\text{change in pos}}{\text{time period}}$$

$$= \frac{f(t) - f(a)}{t - a}$$

func (Prop 1 \vee Prop 2) \in func's

func's behave same patti $x \rightarrow a$

func where \forall why \Rightarrow do we care

(1) have func \Rightarrow know something about them

(2) { (1) andrew has $x \rightarrow a$ plug in func
look at values $x \rightarrow a$, $x^+ \rightarrow a$, $x^- \rightarrow a$ value
of x closer to a \therefore guess the value we
after

(2) \Rightarrow process call taking limit

Definition

limit $f(x) \rightarrow a$ written as

$$\lim_{x \rightarrow a} f(x) = L$$

this is - working def \approx The def of limit

what does it mean

know limits \exists base on work def \Rightarrow how close
we would like $f(x)$. Ex $f(x)$ no more
0.001 from L

$$f(x) - L < 0.001$$

$$L - f(x) < 0.001$$

$$\text{if } f(x) < L$$

\forall must make (closed \cup not closed a)
specific value of x . However, (not closed \cup
closed a) values of x

$$\lim_{x \rightarrow 2} \frac{x^2 + 4x - 12}{x^2 - 2x}$$

$$\text{domain } x^2 - 2x = 0$$
$$\Rightarrow \begin{cases} x = 0 \\ x \end{cases}$$





Computing limit \rightarrow guess graph $\rightarrow y'$
as we move $x \rightarrow a$, we go ask y value
graph at a , what graph doing around a for

1. $3 \in x$, x care for doing at point
concern with around the point

2. $3 + 4 \in x$ same main reason
table values guess limit, same first
rank 1 $\in x$

3. last $2 \in x$ not all limit \in

4. fourth $\in x$, \exists 1 way deal L is
to graph

Why used table or graph:

1 estimate