

Unit 3, 1/29/2021

$$1) \frac{(x^2 - 5x + 6)x}{x - 2}$$

$$\lim_{x \rightarrow 2} \frac{\cancel{(x-2)}(x-3)x}{\cancel{x-2}}$$

$$\frac{(2-3) \cdot 2}{1} = \textcircled{-2}$$

$$2) \lim_{x \rightarrow 1} \frac{x^5 - 1}{x - 1}$$

$$\lim_{x \rightarrow 1} \frac{\cancel{(x-1)}(x^4 + x^3 + x^2 + x + 1)}{\cancel{(x-1)}}$$

$$= 1 + 1 + 1 + 1 + 1 = \textcircled{5}$$

3)

a)

$$\lim_{x \rightarrow -1} \frac{x^4 - 1}{x + 1} = \frac{(x^2 - 1)(x^2 + 1)}{x + 1} = \frac{(x - 1)\cancel{(x + 1)}(x^2 + 1)}{\cancel{x + 1}} = -4$$

b)

$$\lim_{x \rightarrow 0} \frac{\sin^3 x}{\sin x} = \frac{\sin^2 x}{1} = 1$$

no need to heal! $x=0$ 1

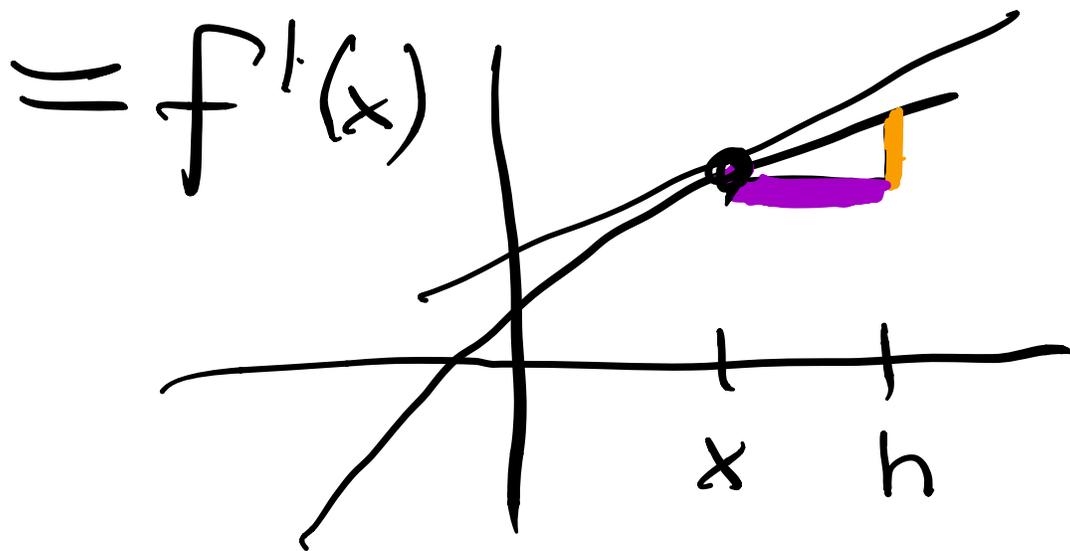
c)

$$\lim_{x \rightarrow 0} \frac{\tan x}{\sin x} = \frac{\cancel{\sin x}}{\cos x \cancel{\sin x}} = \frac{1}{\cos x}$$

$x=0$: 1 = $\sec(x)$

$$\lim_{h \rightarrow 0}$$

$$\frac{f(x+h) - f(x)}{h}$$



→ Slope, velocity

4)

a) $\lim_{x \rightarrow 0} \frac{\sin^2(x^3)}{x^6} =$

$\lim_{x \rightarrow 0}$

$$\frac{\sin(x^3)}{x^3} \cdot \frac{\sin(x^3)}{x^3}$$

$= 1 \cdot 1 = 1$

b) $\lim_{x \rightarrow 0} \frac{5x}{\sin 7x} = \frac{5}{7}$

(Note: The original image shows a pink circle around the fraction $\frac{5x}{\sin 7x}$ and a pink arrow pointing to the boxed result $\frac{5}{7}$. The fraction is also written as $\frac{5 \cdot \frac{7x}{7}}{\sin 7x}$ with pink annotations.)

c) $\lim_{x \rightarrow 0} \frac{5x(x^2-1)}{\sin 7x(x-1)}$

(Note: The original image has an orange circle around the fraction and an orange arrow pointing to the right.)

$\lim_{x \rightarrow 0} \frac{5x}{\sin 7x} \cdot \frac{(x-1)(x+1)}{(x-1)}$

(Note: The original image has pink circles around both fractions and pink arrows pointing to the next steps.)

$\frac{5}{7} = \frac{5}{7}$

(Note: The original image has pink circles around both $\frac{5}{7}$ terms.)

$\lim_{x \rightarrow 0} \frac{5x}{\sin 7x}$

(Note: The original image has a black circle around this expression.)

$\lim_{x \rightarrow 0} \frac{x^2-1}{x-1} = 1$

(Note: The original image has a black circle around this expression and a note "no problem at x=0" with an arrow pointing to the denominator.)