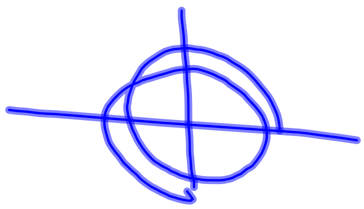
$$\lim_{x \to \frac{7\pi}{18}} \cos(9x - \cos(9x))$$

$$\cos\left(9\left(\frac{7\pi}{18}\right) - \cos\left(9\left(\frac{7\pi}{18}\right)\right)\right)$$

$$= \cos\left(\frac{7\pi}{2} - \cos\left(\frac{7\pi}{2}\right)\right)$$

$$= \cos\left(\frac{7\pi}{2}\right) = 0$$



limits - Plug in the # if possible

Continuity - $\left.\begin{array}{l}\sqrt{\text{negative}} \\ \dfrac{\text{stuff}}{0}\end{array}\right\}$ BAD

§2.2 #65

§ $1 - \frac{x^2}{6} < \frac{x \sin x}{2 - 2\cos x} < 1$ $\forall x$ close to $x=0$

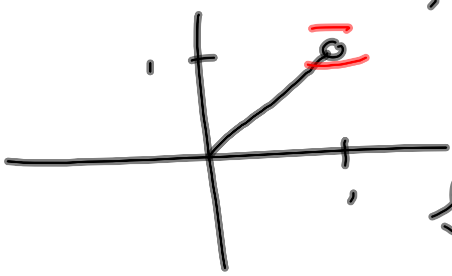
Then $\lim \cdots \leq \lim \cdots \leq 1$

$$\lim_{x\to 0} 1 - x^2/6 \leq \lim_{x\to 0} \frac{x \sin x}{2-2\cos x} \leq 1$$

$$1 \leq \lim_{x\to 0} \frac{x \sin x}{2-2\cos x} \leq 1$$

$\frac{1}{x} > 0$ for $x > 0$, BUT

$\lim_{x\to\infty} \frac{1}{x} = 0$



$f(x) = x$ on $[0,1)$

$f(x) < 1$ on $[0,1)$ and

$\lim_{x\to 1} f(x) = 1.$

$f(x) = x^2 \qquad \varepsilon = .5,\ x_0 = -2,\ L = 4$

Find interval containing x_0 $\ni$ $|f(x) - L| < \varepsilon$ holds. $\rightarrow (x_0 - \delta, x_0 + \delta)$

want $|x^2 - 4| < .5$

& want to end up with condition on δ that guarantees we get what we want.

$$|x^2 - 4| < .5$$

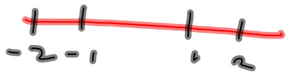
$$-.5 < x^2 - 4 < .5$$

$$3.5 < x^2 < 4.5$$

$$\sqrt{3.5} < \sqrt{x^2} < \sqrt{4.5}$$

$$\sqrt{3.5} < |x| < \sqrt{4.5}$$

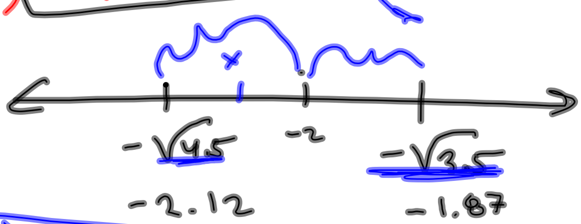
$x_0 = -2 \Longrightarrow$ x is CLOSE to $x_0 = -2$, so $x < 0$



$$\sqrt{3.5} < -x < \sqrt{4.5}$$

$$-\sqrt{3.5} > x > -\sqrt{4.5}$$

$$-\sqrt{4.5} < x < -\sqrt{3.5}$$

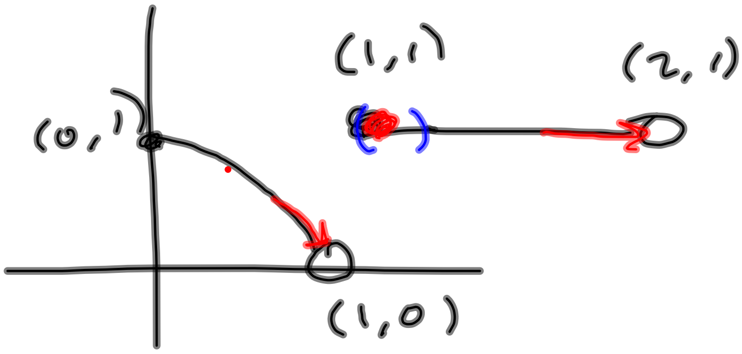


$\delta = .12$ does the trick.

$$0 < |x + 2| < \delta$$

$$-\delta < x + 2 < \delta$$

$$-2 - \delta < x < \underbrace{-2 + \delta}_{\varepsilon}$$



The values $c \ni \lim_{x \to c} f(x) \exists$ are:

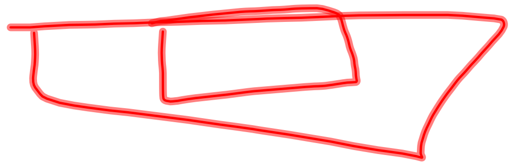
$c \in (0,1) \cup (1,2)$

c) where's only a left hand limit?

$c \in \{2\}$

Find slope of $f(x) = x^2 + 10x - 1$

@ $x = 2$



$$\frac{f(2+h) - f(2)}{h}$$

$$\frac{f(x+h) - f(x)}{h} = \frac{(x+h)^2 + 10(x+h) - 1 - (x^2 + 10x - 1)}{h}$$

$$\frac{x^2 + 2xh + h^2 + 10x + 10h - 1 - x^2 - 10x + 1}{h}$$

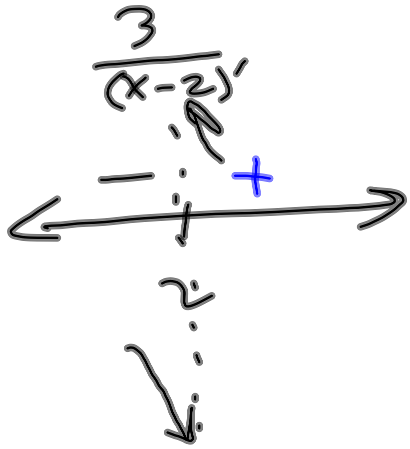
$$= \frac{2xh + h^2 + 10h}{h} = 2x + h + 10 \xrightarrow{h \to 0} 2x + 10$$
$$= f'(x).$$

$\Rightarrow$ Slope $= m = f'(2) = 2(2) + 10 = \boxed{14 = m_{tan}}$

Eq'n of tangent line @ $x = 2$.

$$\begin{array}{r|rrr} 2 & 1 & 10 & -1 \\ & & 2 & 24 \\ \hline & 1 & 12 & 23 = f(2) \end{array}$$

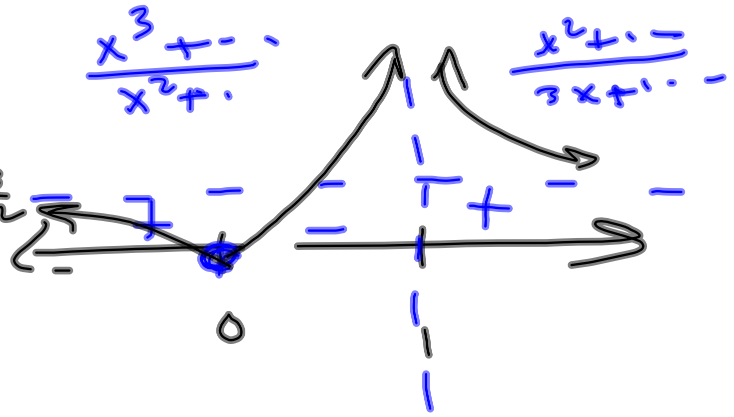
$$\boxed{y = 14(x-2) + 23}$$



$$y = \frac{3}{2}\left(\frac{x}{x-1}\right)^{2/3}$$

$$\frac{x}{x-1}$$

$y = 1$



$$\frac{x}{x-1} = \frac{x}{x-\text{small}} \xrightarrow{x\to\infty} \approx 1$$

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

$$x-5\,\overline{)\,x^2+5x+1}$$