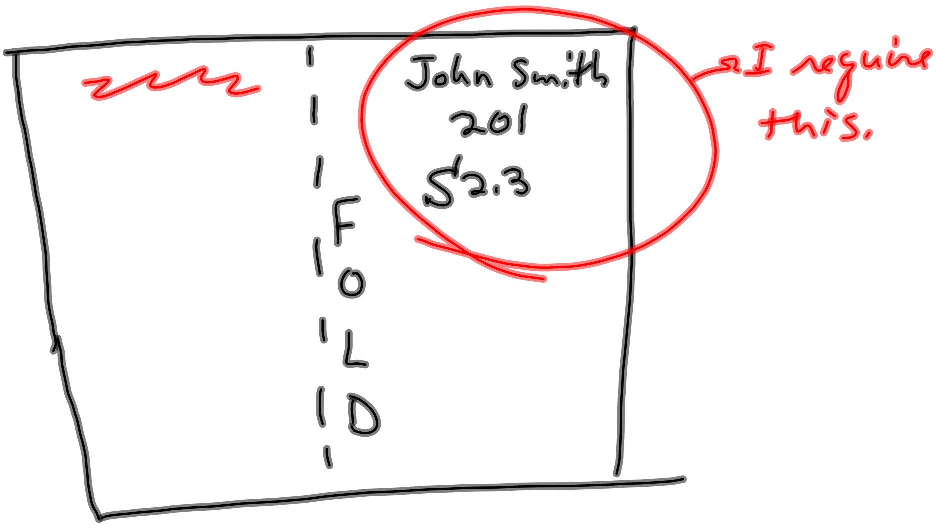
Some Homeworks are looking like answer keys. I require written work & context.

See Solutions Online for what I mean.



2.4 Tues
2.5 Wed
2.6 Thurs

Test 1 Early the following week

§2.5 Continuity.

Very closely tied to §2.2

Theorem 1 (§2.2) $\longleftrightarrow$ Theorem 8 (§2.5)

Removable Discontinuity means you can create a CONTINUOUS EXTENSION.

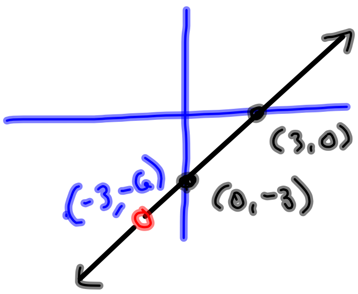
$f(x) = \frac{x^2-9}{x+3}$ is cont^s everywhere, except @ $x=-3$. We've seen $\lim_{x\to -3} \frac{x^2-9}{x+3}$

$= \lim_{x\to -3} \frac{(x-3)(x+3)}{x+3} = \lim_{x\to -3} (x-3) = -6$

One way to extend $f(x)$ to all of $\mathbb{R}$:

$$f^*(x) = \begin{cases} \frac{x^2-9}{x+3} & \text{if } x \neq -3 \\ -6 & \text{if } x = -3 \end{cases}$$

$f(x)$:



Just like $g(x) = x-3$, but with a hole @ $(-3,-6)$

$f^*(x)$: Just replace $f(-3)$ with $\lim_{x\to -3} f(x)$

$f(x) = \frac{\sin x}{x}$ is cnt^s everywhere except @ $x = 0$.

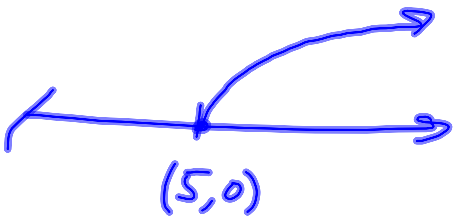
$\lim_{x \to 0} \frac{\sin x}{x} = 1$, so Define $f^*(x)$ by

$$f^*(x) = \begin{cases} \frac{\sin x}{x} & \text{if } x \neq 0 \\ 1 & \text{if } x = 0 \end{cases}$$

Aug 31-12:30 PM

Jump to § 2.4 #47 : $\sqrt{x-5}$

Given $\varepsilon > 0$, find interval $I = (5, 5+\delta)$, $\delta > 0$ such that if $x \in I$, then $\sqrt{x-5} < \varepsilon$.
what limit is being discussed, here? what's its value.



your
you're
They're
Their
There

$$\boxed{\lim_{x\to 5^+}\sqrt{x-5} = 0}$$

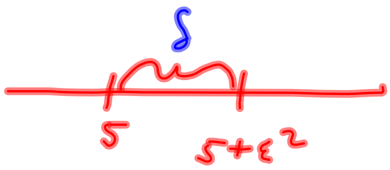
still need δ :

$$\left|\sqrt{x-5} - 0\right| < \varepsilon$$

$$\sqrt{x-5} < \varepsilon$$

$$\boxed{x-5 < \boxed{\varepsilon^2} \equiv \delta}$$

$$x < \varepsilon^2 + 5$$



$\sqrt{\ }$ is principal square root. Always ≥ 0, if it's real. If it's nonreal, then it's the root with the smallest argument (angle measured counterclockwise from positive real axis.)

§2.4 #52b.

$\left|\sin\left(\frac{1}{x}\right)\right| \le 1$

$$f(x) = \begin{cases} x^2 \sin\left(\frac{1}{x}\right), & x < 0 \\ \sqrt{x}, & x > 0 \end{cases}$$

$$\boxed{\lim_{x \to 0^-} f(x) = 0}$$

$y \le 5$

$|xy| \le |x||y| \le |x| \cdot 5 = 5|x|$

want $\left| x^2 \sin\left(\frac{1}{x}\right) - 0 \right| < \varepsilon$

STEP 1 $\left|x^2 \sin\left(\frac{1}{x}\right)\right|$

$= |x^2| \underbrace{\left|\sin\left(\frac{1}{x}\right)\right|} \le |x^2| \underbrace{|1|}$

$\le |x^2|$

$|-1| = 1$

$= -(-1)$

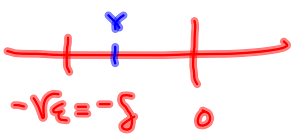
$= x^2 \overset{\text{want}}{<} \varepsilon$, i.e., want

$\sqrt{x^2} < \sqrt{\varepsilon}$

$|x| < \sqrt{\varepsilon}$

$-x < \sqrt{\varepsilon}$

STEP 2 $x > -\sqrt{\varepsilon}$



$|x - 0| < \delta$

$|x| < \delta$

$-x < \delta$

$x > -\delta$

$$\boxed{\text{Let } \delta = \sqrt{\varepsilon}}$$