§2.1 #8, 20,

(20) $\dfrac{f(T)-f(2)}{T-2} = \dfrac{\frac{1}{T}-\frac{1}{2}}{T-2} = \dfrac{\frac{2-T}{2T}}{T-2}$

$= \dfrac{2-T}{2T(T-2)} = \dfrac{-(T-2)}{2T(T-2)} = -\dfrac{1}{2T} \xrightarrow{T\to 2} -\dfrac{1}{4}$

$\lim\limits_{T\to 2}$ Stuff

(8) $f(x)=5-x^2$, $P(1,4)$

$\dfrac{f(1+h)-f(1)}{h} = \dfrac{5-(1+h)^2-(5-1^2)}{h} = \dfrac{5-(1+2h+h^2)-4}{h}$

$= \dfrac{5-1-2h-h^2-4}{h} = \dfrac{-2h-h^2}{h} = \dfrac{h(-2-h)}{h} = -2-h$

$\xrightarrow{h\to 0} \boxed{-2 = m_{tan}} = f'(1)$

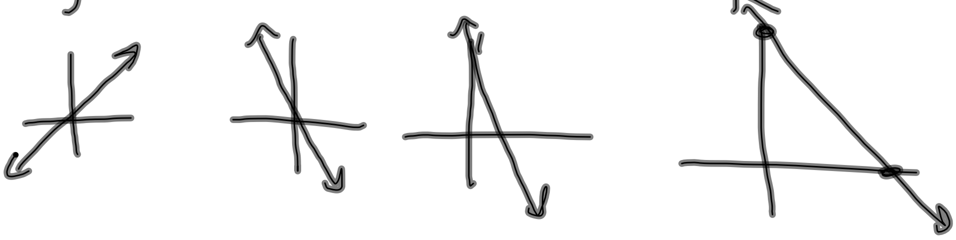
$y = m(x-x_1)+y_1$

$y = m_{tan}(x-x_1)+y_1$

$y = f'(x_1)(x-x_1)+f(x_1)$

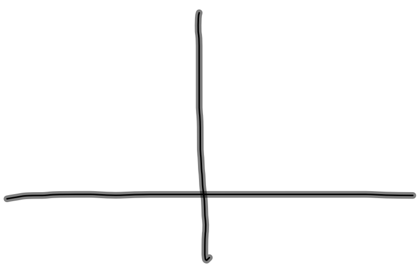
$\boxed{y = -2(x-1)+4}$

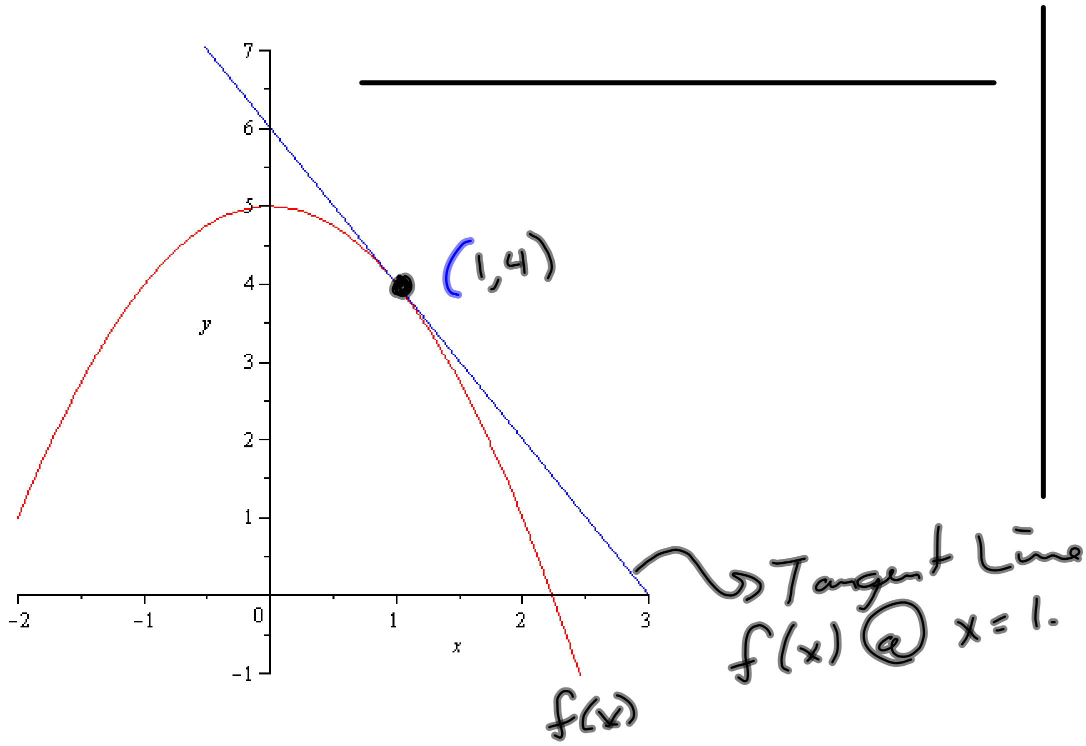
$y = x \longrightarrow -2x \longrightarrow -2(x-1) \longrightarrow -2(x-1)+4$

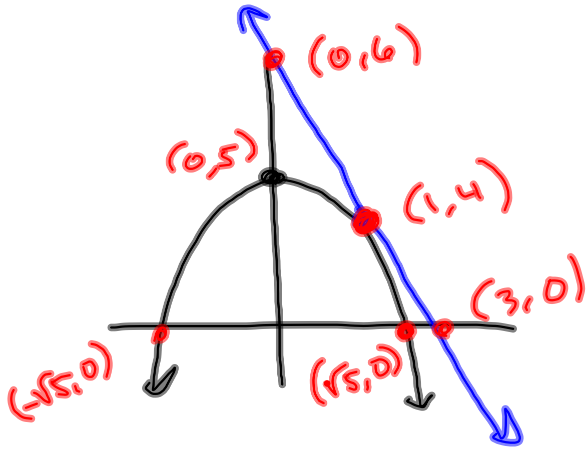


$y = -2x+2+4$

$y = -2x+6$




(1,4)
f(x)
Tangent Line
f(x) @ x = 1.
x
y
-2 -1 0 1 2 3
-1 1 2 3 4 5 6 7



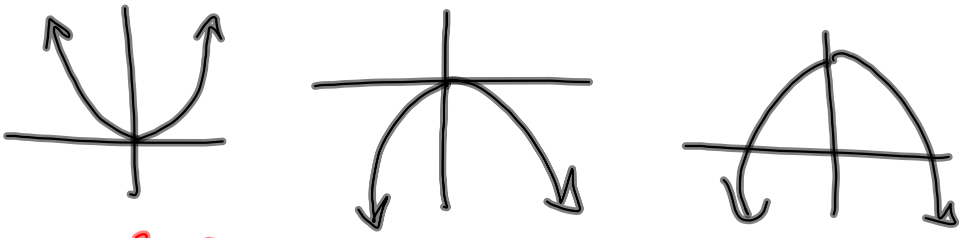
x-int:

$-2(x-1)+4=0$

$-2x+2=-4$

$-2x=-6$

$x=3$



$5-x^2=0$

$5=x^2$

$\sqrt{5}=\sqrt{x^2}=|x|$

$|x|=5$

$x=\sqrt{5}$ or $x=-\sqrt{5}$

$x=\pm\sqrt{5}$

Love this Class.

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

$2ax=-b\pm\sqrt{b^2-4ac}$

$2ax+b=\pm\sqrt{b^2-4ac}$

$|2ax+b|=\sqrt{b^2-4ac}$

$(2ax+b)^2=b^2-4ac$

$(\sqrt{x})^2=x$

$\sqrt{x^2}=|x|$

$\sqrt{\sin^2 x}=|\sin x|$

$\sqrt{(-3)^2}=3$

$\sqrt{9}=3$

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

$$= \lim_{x\to -3} \frac{1}{x+1} = \frac{1}{-3+1} = -\frac{1}{2}$$

Evaluating Limits empirically (Digitally) by plugging in values is a good check, but not really legit.

$$\lim_{h\to 0} \left(\frac{\sqrt{x+h}+\sqrt{x}}{h}\right)\cdot\left(\frac{\sqrt{x+h}-\sqrt{x}}{\sqrt{x+h}-\sqrt{x}}\right) \text{ etc.}$$

Aug 23-12:35 PM

#55 §2.2

Given $\lim_{x\to b} f(x) = 7$, $\lim_{x\to b} g(x) = -3 \Longrightarrow$

(a) $\lim_{x\to b} (f(x)+g(x)) = 7 + -3 = 4$, etc.

f(x)

$\boxed{\lim_{x\to 0} f(x) \nexists}$ because.

$\lim_{x\to 0^-} f(x) = 2 \neq 3 = \lim_{x\to 0^+} f(x)$

§2.2 Due Monday

§2.3 Due Wednesday

Shorthand §2.3

$\exists$ - There is or There exists.

$\Longrightarrow$ - Implies

$\ni$ - such that or so that

$\forall$ - For all or for each or for every.

$\mathbb{R}$, $\mathbb{N}$, $\mathbb{Z}$

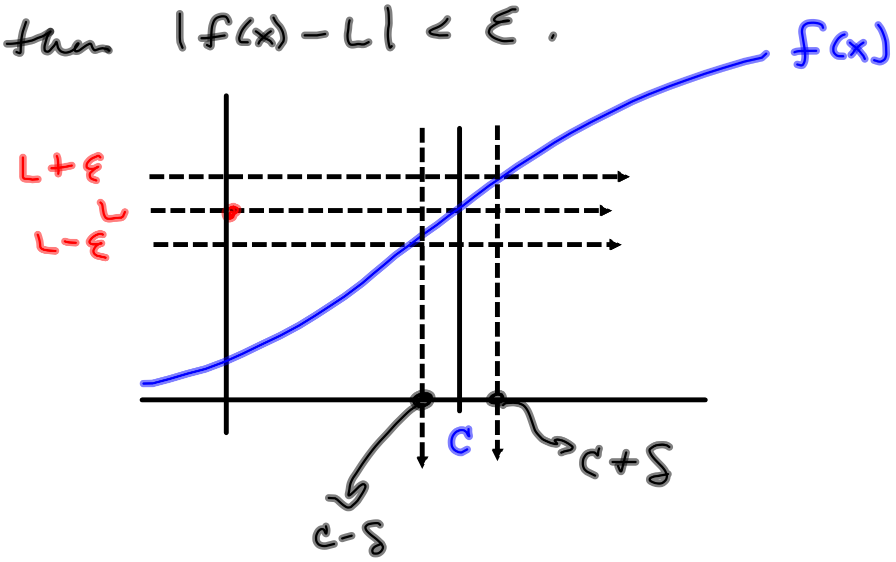
Reals, Natural #s, Integers

FORMAL DEFINITION OF LIMIT

The limit, as x approaches c, of $f(x)$ is L is written

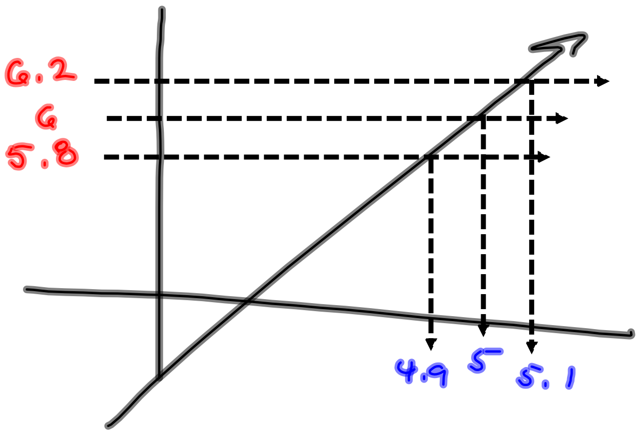
$$\lim_{x \to c} f(x) = L$$, which means

Given $\varepsilon > 0$, $\exists$ $\delta > 0$ $\ni$ if $0 < |x-c| < \delta$, then $|f(x) - L| < \varepsilon$.



§2.3 #7

$f(x)$ pictured



$f(x) = 2x - 4$

$x_0 = 5$

$L = 6$

$\varepsilon = 0.2$

Find $\delta \ni \forall x$ with $0 < |x - x_0| < \delta$, we have $|f(x) - L| < \varepsilon$

$\delta = 0.1$ Keeps us in the window.