October 31, 2025

National Caramel Apple Day

Today in History:

Martin Luther posts 95 theses (1517)

The Adventures of Sherlock Holmes published (1892)

Number of the Day: 182

182 = 2 x 7 x 13

182 is 222 in base 9 and 77 in base 25.

Fun Fact:

The first Fords had engines made by Dodge.

Quote of the Day:

"Left hand, right hand, it doesn't matter. I'm amphibious."

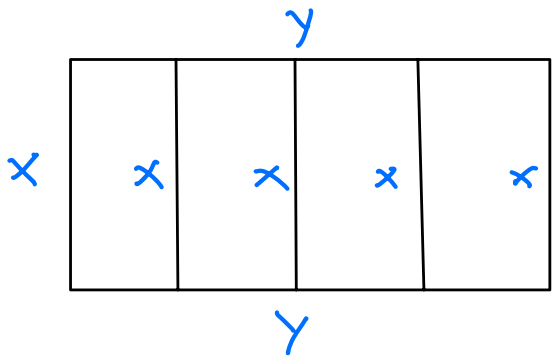
– Charles Shackleford

Today's Weather:

Windy with a few showers. High 53°.

Math 121 - Quiz #32

A rectangular area with fence all around is to be divide into four smaller areas by running three lengths of fence parallel to one side. If you have 500 miles total of fence, what is the largest area that can be enclosed?



$A = xy$ $\qquad 5x + 2y = 500$

$y = \dfrac{500 - 5x}{2}$

$A = x\left(\dfrac{500 - 5x}{2}\right)$

$A = \dfrac{1}{2}(500x - 5x^2)$

$\dfrac{dA}{dx} = \dfrac{1}{2}(500 - 10x) = 0 \qquad x = 50$

$x = 0 \qquad x = 100$

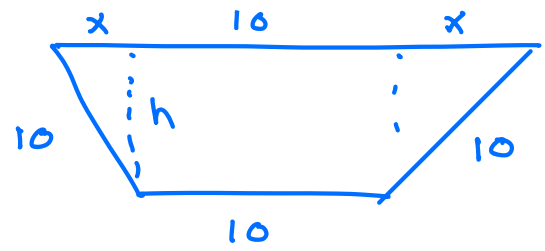
x	A
50	6250 sq miles MAX
0	0
100	0

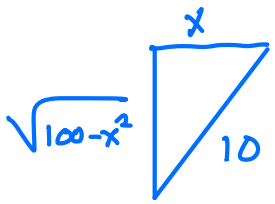
mpod 32

* 4

$x=0$

$x=10$





$$A = \left(\frac{b+10}{2}\right)h = \left(\frac{(10+2x)+10}{2}\right)\sqrt{100-x^2}$$

$$A = (10+x)\sqrt{100-x^2}$$

$$\frac{dA}{dx} = (10+x)\left(\frac{1}{2}(100-x^2)^{-\frac{1}{2}}(-2x)\right) + \sqrt{100-x^2}$$

$$= \frac{-x(10+x)}{\sqrt{100-x^2}} + \sqrt{100-x^2} = 0$$

$$\frac{x(10+x)}{\sqrt{100-x^2}} = \sqrt{100-x^2}$$

$$10x + x^2 = 100 - x^2$$

$$2x^2 + 10x - 100 = 0$$

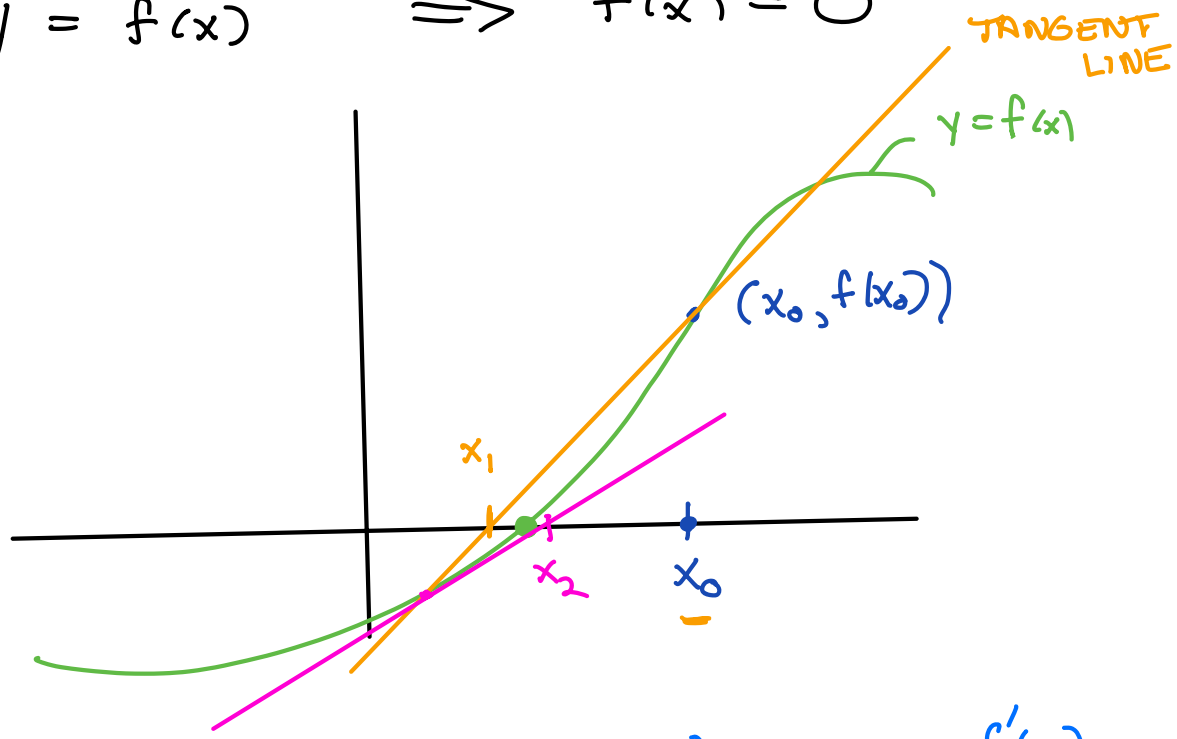
$$(2x+20)(x-5) = 0$$

~~$x=-10$~~ $x=5$

x	A
→ 5	MAX
0	
10	

NEWTON'S METHOD

$y = f(x) \Rightarrow f(x) = 0$



TANGENT LINE $(x_0, f(x_0))$ SLOPE $f'(x_0)$

$$y - f(x_0) = f'(x_0)(x - x_0)$$

$$0 - f(x_0) = f'(x_0)(x - x_0)$$

$$-f(x_0) = f'(x_0)x - f'(x_0)x_0$$

$$-f(x_0) + f'(x_0)(x_0) = f'(x_0)x$$

$$x_1 = x_0 - \frac{f(x_0)}{f'(x_0)}$$

$$x_2 = x_1 - \frac{f(x_1)}{f'(x_1)}$$

$$x_3 = x_2 - \frac{f(x_2)}{f'(x_2)}$$

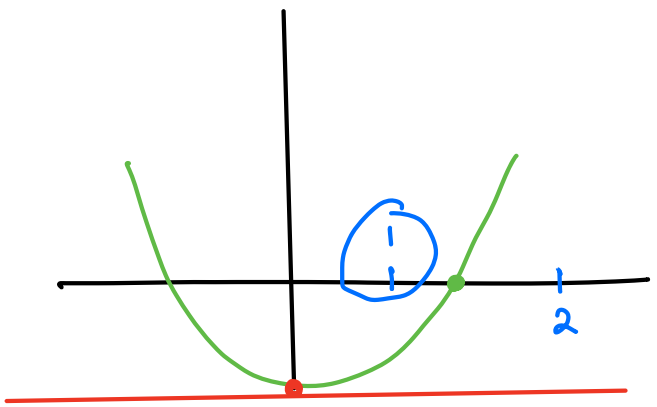
NEWTON'S METHOD FORMULA

$$x_{N+1} = x_N - \frac{f(x_N)}{f'(x_N)}$$

(1) WHERE TO START? (OR WHERE NOT TO START)

(2) WHEN SHOULD WE STOP?

EXAMPLE 1 $\quad f(x) = x^2 - 2 \quad\quad x^2 - 2 = 0$



$$x_0 = 1$$

$$x_{N+1} = x_N - \frac{f(x_N)}{f'(x_N)}$$

$$x_{N+1} = x_N - \frac{x_N^2 - 2}{2x_N}$$

x_N	x_{N+1}
1	1.5
1.5	1.41666
1.41666	1.414216
1.414216	

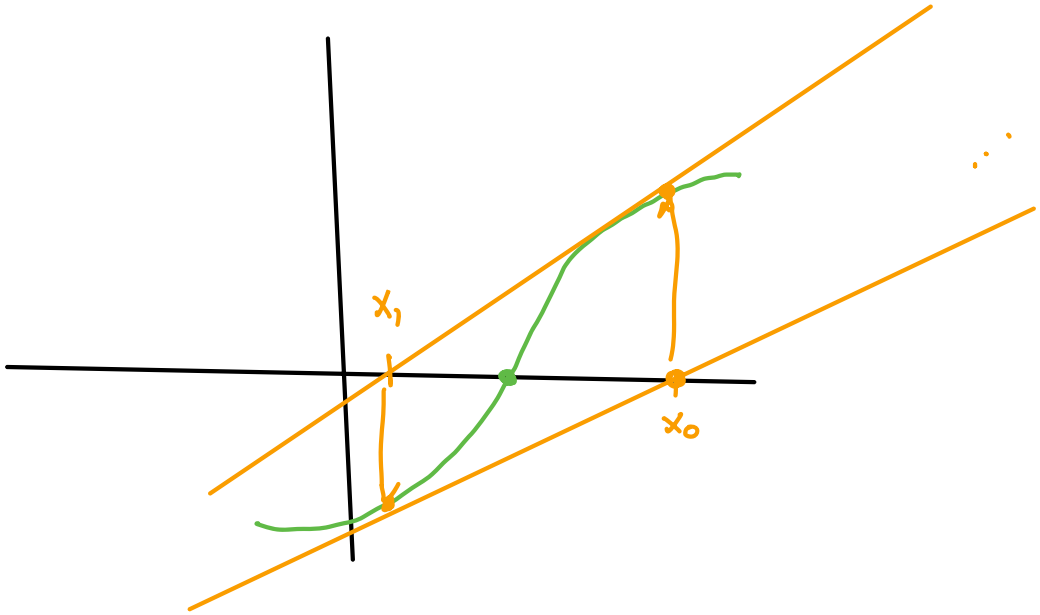
$$1 - \frac{1-2}{2} = 1.5$$

$$1.5 - \frac{(1.5)^2 - 2}{2} = 1.41666$$

$x_0 = 0$

START "NEAR" ROOT

STAY AWAY FROM WHERE $f'(x) = 0$



$$f(x) = \underline{2x^3 + x^2 - x + 1} = 0$$

$$x_{N+1} = x_N - \frac{f(x_N)}{f'(x_N)}$$

$$= x_N - \frac{2x_N^3 + x_N^2 - x_N + 1}{6x_N^2 + 2x_N - 1}$$

5 DEC. PLACES.

$x_0 = -1.2$

x_N	x_{N+1}	
-1.2	-1.23551	
-1.23551	-1.23375	SAME
-1.23375	-1.23375	

STOP