

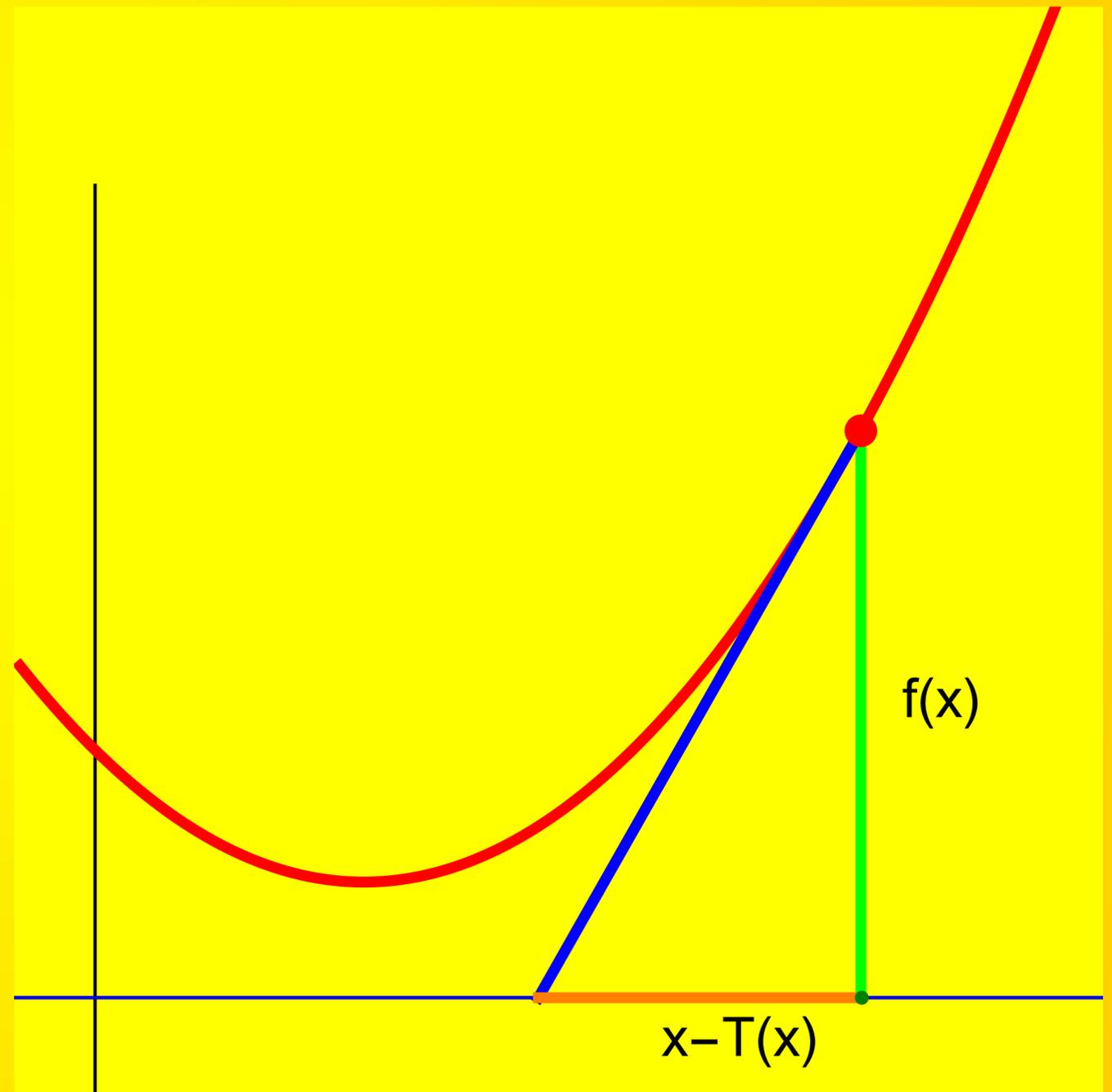
14

Roots

x is a root if $f(x)=0$

$$T(x) = x - \frac{f(x)}{f'(x)}$$

Newton Step



Exam reminders

Exam released Friday.

Honor Code! You have read it and will sign it.

One page of notes allowed.

No calculators, no online resources allowed.

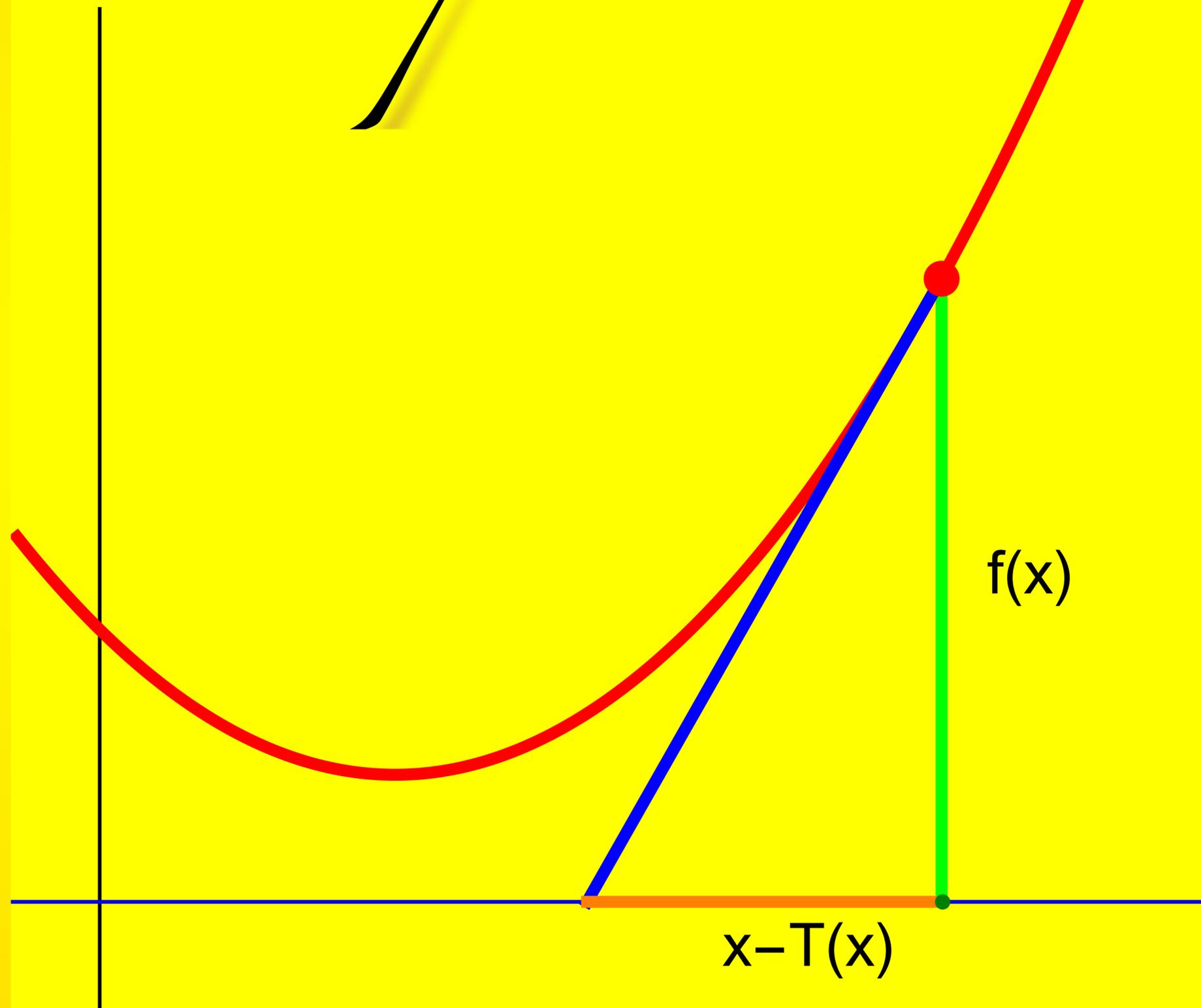
Done in one sitting except bathroom visits or AEO.

Submit by email to me (I will acknowledge).

Newton Step

x is a root if $f(x)=0$

$$T(x) = x - \frac{f(x)}{f'(x)}$$

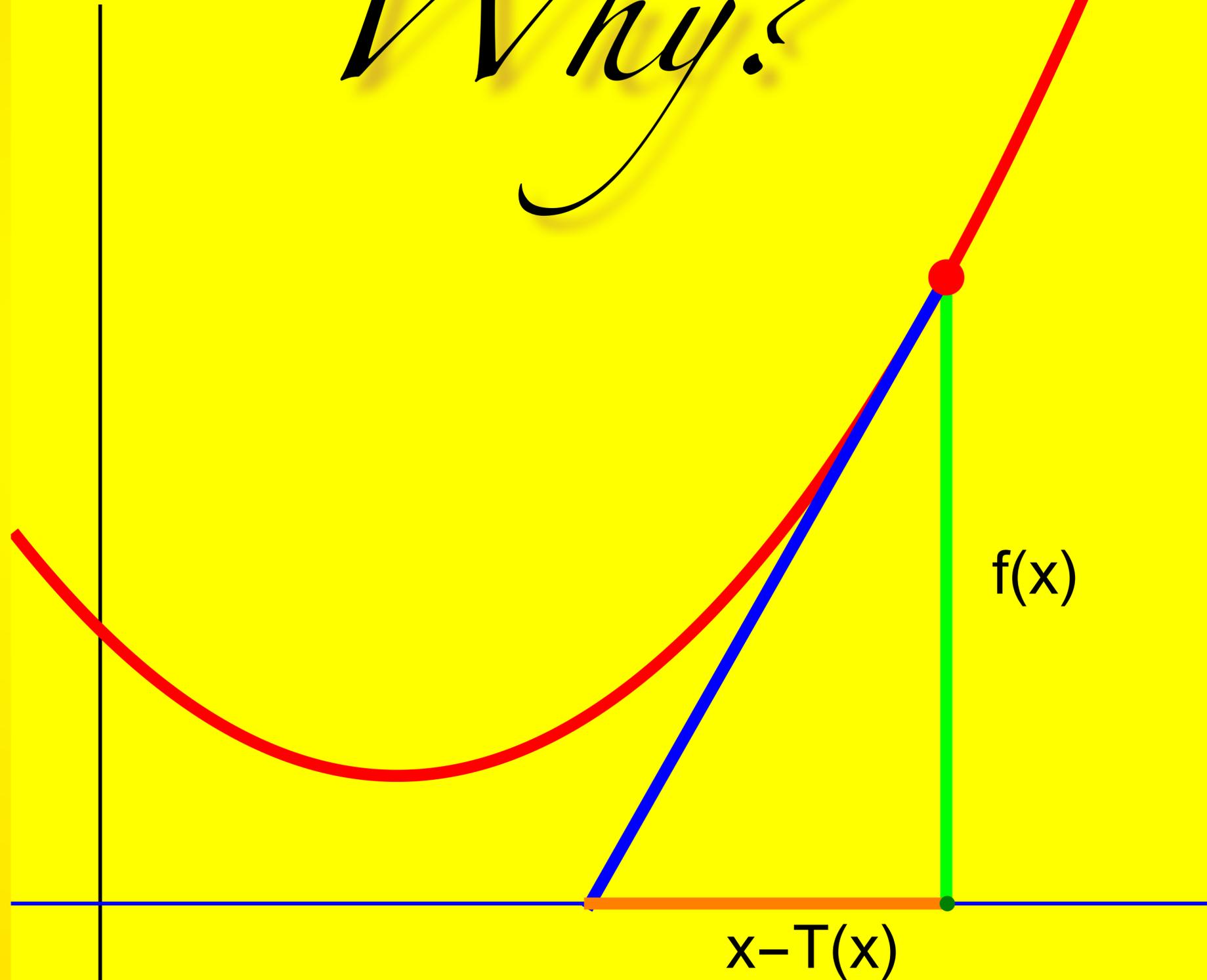


Look at the triangle
and see that

$$f'(x) = \frac{f(x)}{x - T(x)}$$

$$T(x) = x - \frac{f(x)}{f'(x)}$$

Why?



Example: $f(x) = \sin(x)$

What is the step?

$$T(x) = x - \frac{f(x)}{f'(x)}$$

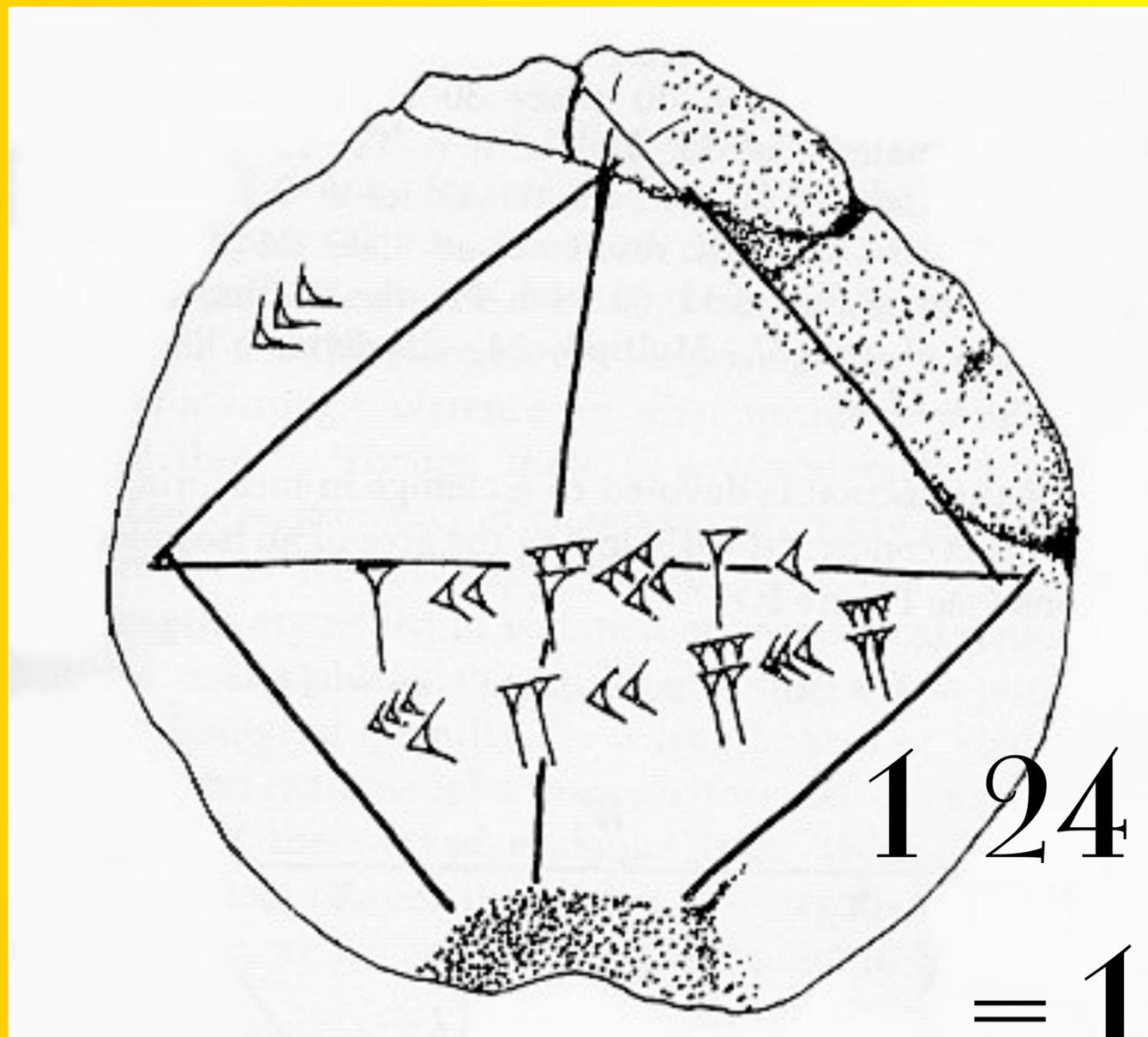
Square roots

$$f(x) = x^2 - 2 = 0$$

$$T(x) = x - \frac{f(x)}{f'(x)} = 1 - \frac{x^2 - 2}{2x}$$

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

YBC 7289



1 24 51 10

= 1.41421

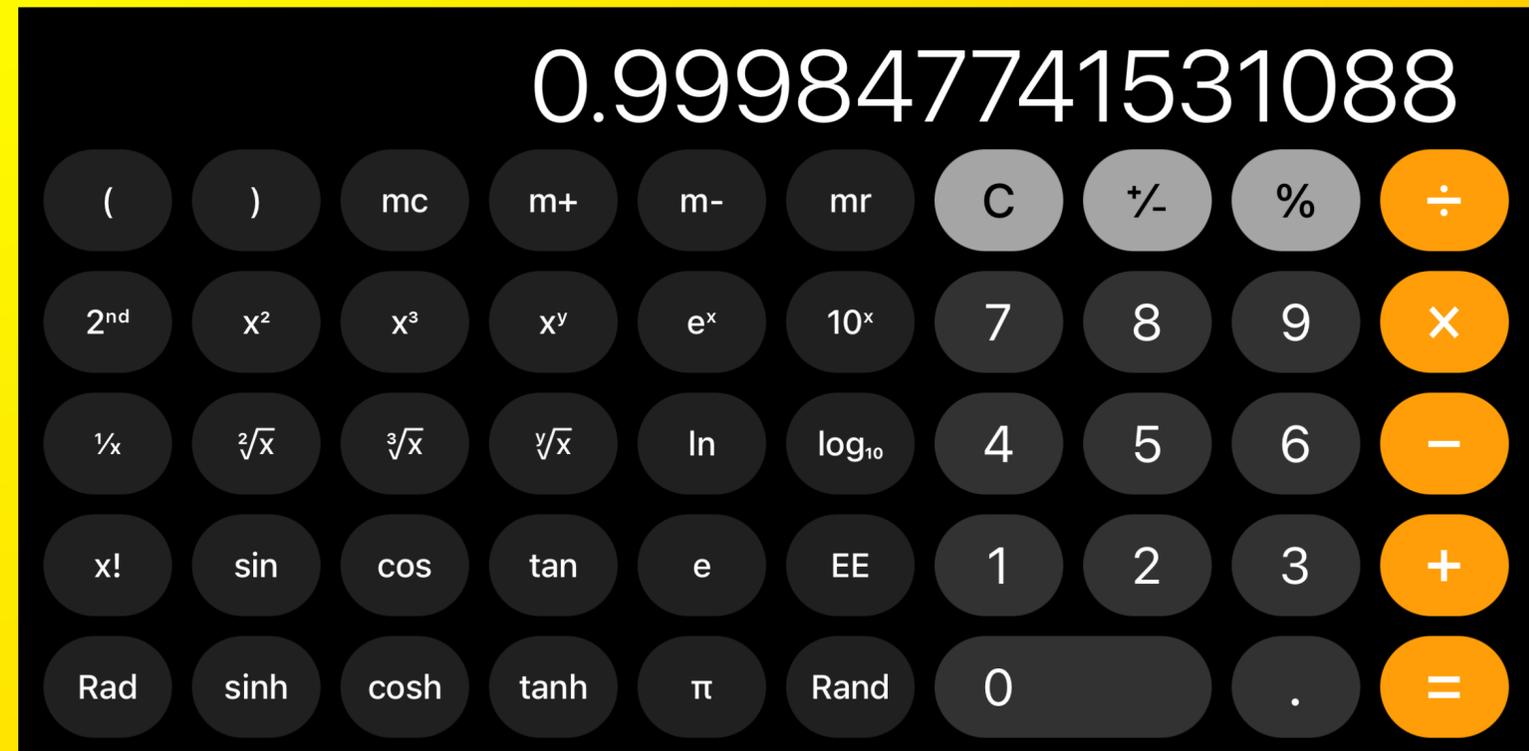
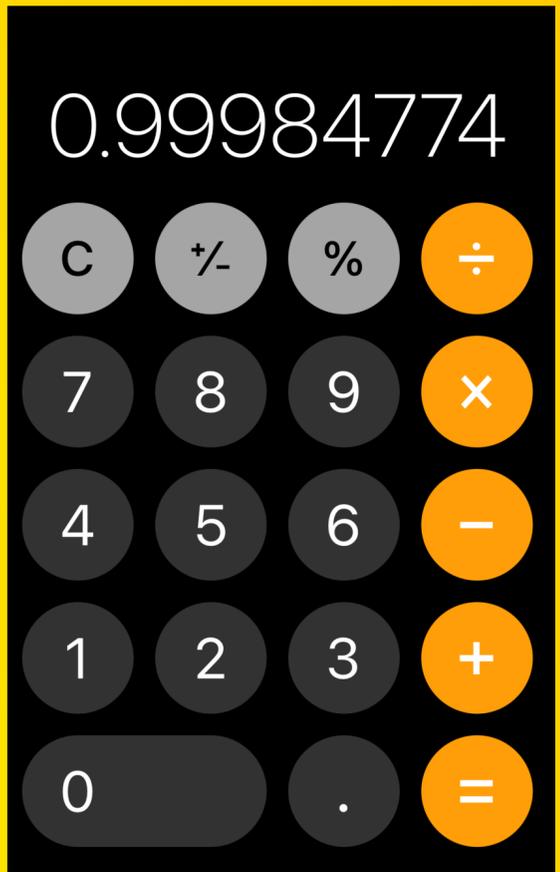
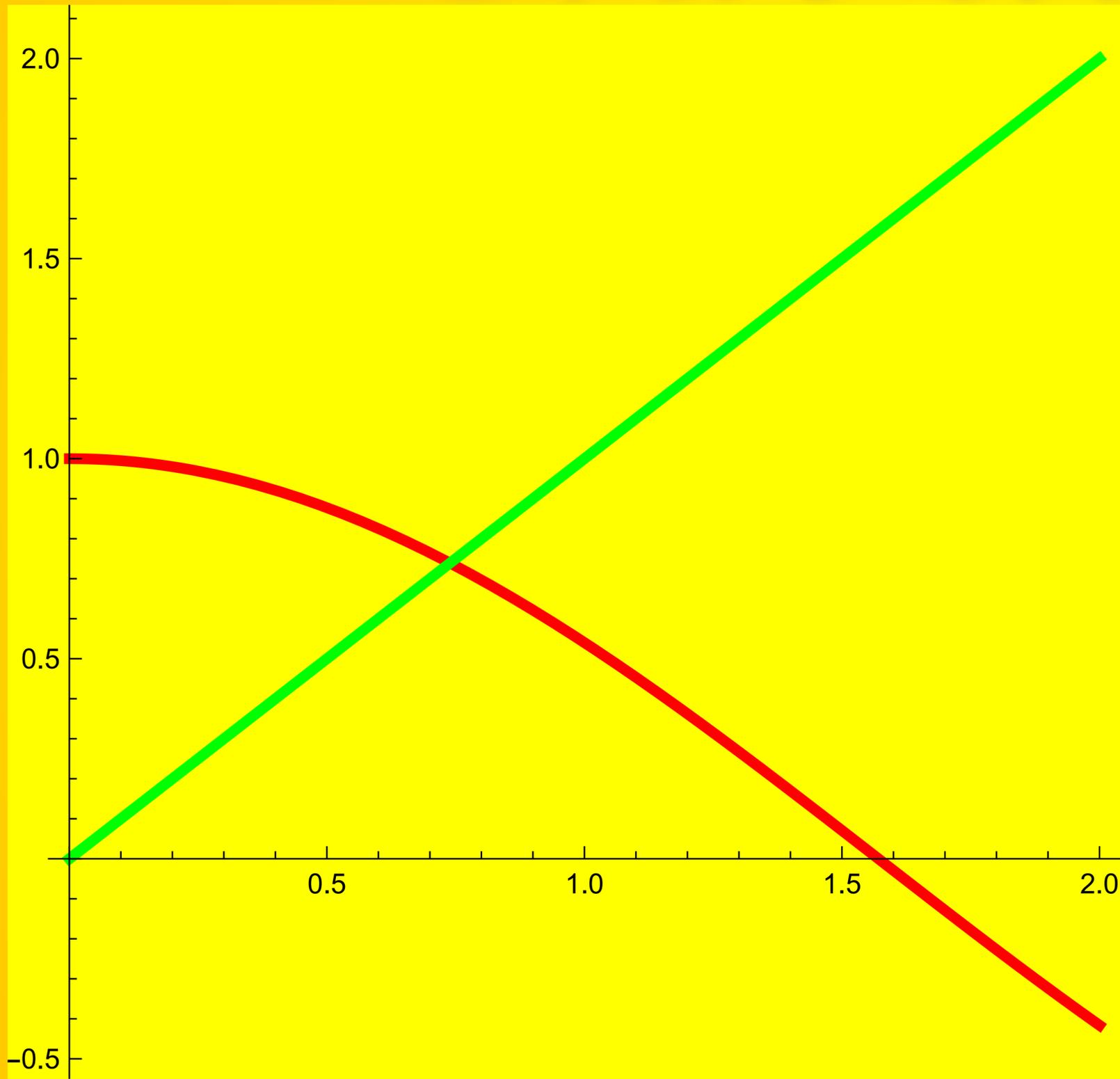
Solve $\cos(x) = x$

flip

phone and

push cos again

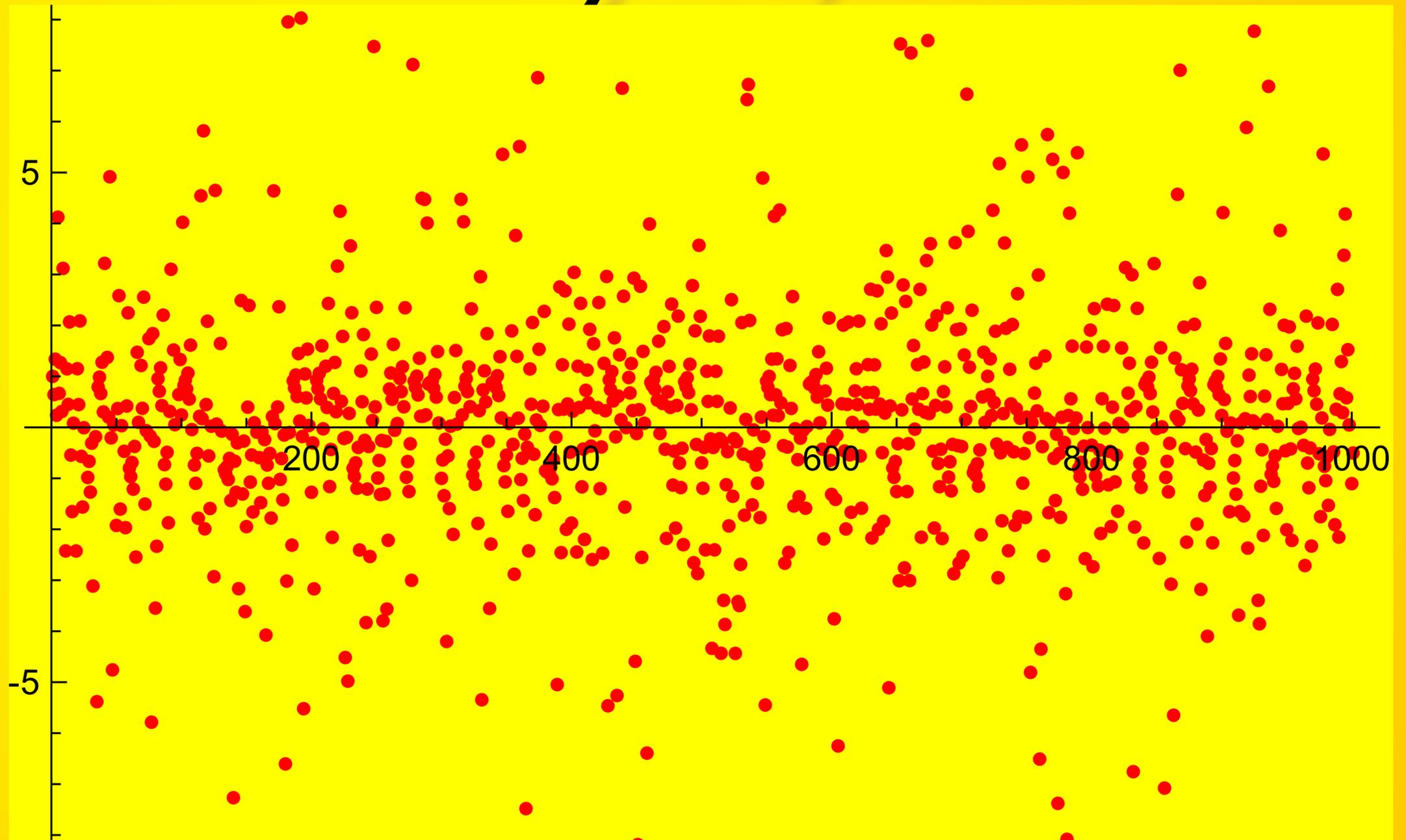
and again!



Third Data project

Chaos

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ListPlot[  
NestList[  
Cot, 1.0,  
1000]
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Calculator

⚙️ ⌚ Ⓐ
Deg

72.4508137198242

1 tan ¹/_x tan ¹/_x tan ¹/_x tan

()	mc	m+	m-	mr	C	+/-	%	÷
2 nd	x ²	x ³	x ^y	e ^x	10 ^x	7	8	9	×
¹ / _x	² √x	³ √x	^y √x	ln	log ₁₀	4	5	6	-
sin	cos	tan	e	EE	1	2	3	+	
sinh	cosh	tanh	π	Rand	0	.	=		

The End