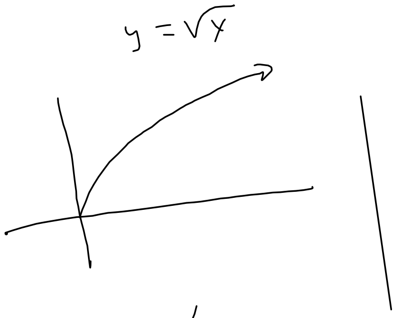
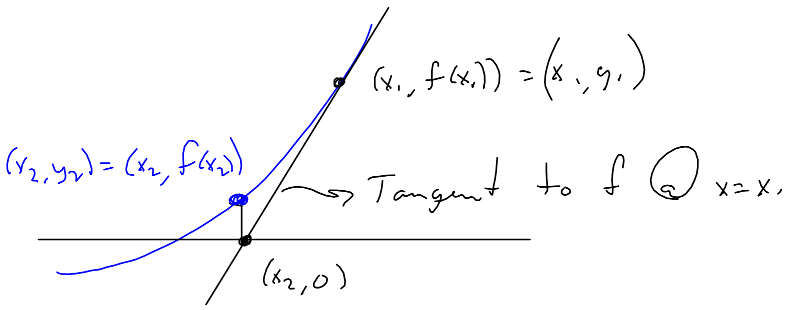


To maximize/minimize

$\sqrt{\text{STUFF}}$ – just max/min STUFF,

b/c $\sqrt{x}$ is increasing function

Newton's Method on a spreadsheet §3.8



$x_1 =$ guess!

Set tangent line $= 0$

$$y = f'(x_1)(x - x_1) + f(x_1) = 0$$

Solve for $x = x_2$

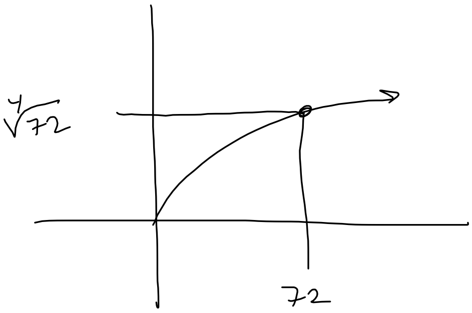
$$f'(x_1)\underbrace{x}_{x = x_2} - f'(x_1)x_1 = -f(x_1)$$

$$f'(x_1)x_2 = f'(x_1)x_1 - f(x_1)$$

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

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

$f(x) = \sqrt[4]{x}$



$\sqrt[4]{72}$ is a root of

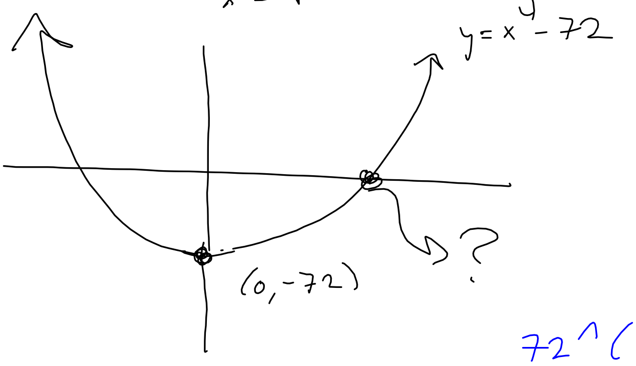
$g(x) = x^4 - 72 = 0$

$\sqrt{2}$

$x^4 = 72$

$\sqrt[4]{} = \sqrt[4]{}$

$x = \sqrt[4]{72}$



72^(1/4) ≈ 2.91

$x_1 = 3$

$x_1 = 3$

$f(x) = x^4 - 72$

$f'(x) = 4x^3$

$$x_2 = x_1 - \frac{f(x_1)}{f'(x_1)} = 3 - \frac{f(3)}{f'(3)} = 3 - \frac{3^4 - 72}{4 \cdot 3^3}$$

$$= 3 - \frac{81 - 72}{108} = 3 - \frac{9}{108} = 2.91\overline{6}$$

#8. $f(x)=\sqrt{x+4}-x^2+x$

Tough by hand:

$\sqrt{x+4} = x^2 - x$

$x+4 = x^4 - 2x^3 + x^2$

Quartic. Painful.

IOU 2 vids

Nikole's question on the trig graph.

Last Friday's polynomial

What's an antiderivative for cosine?

$\frac{d}{dx}\left[? \right] = \cos(x)$

$\sin(x) + 11!$

Every derivative you know gives you an antiderivative

$\int \cos(x)\,dx = \sin(x) + C$

$\int \sec^2 x\,dx = \tan x$

$\int \tan x\,dx = ?$

is tough!

$\int x^n dx = \frac{x^{n+1}}{n+1}$

$\frac{d}{dx}\left[\frac{x^{n+1}}{n+1}\right] = (n+1)\left(\frac{x^n}{n+1}\right) = x^n$ See?

This works for any $n \neq -1$

$$\boxed{\int \frac{1}{x}\,dx = \ln|x| + C}$$

$$\int \sin(x)\,dx = -\cos(x) + C$$

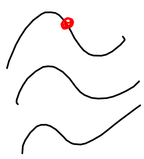
$\frac{d}{dx} \longrightarrow$

$\int dx \longleftarrow$

$\sin x$	$\cos x$
$\cos x$	$-\sin x$
$\tan x$	$\sec^2 x$
$\sec x$	$\sec x \tan x$
$\csc x$	$-\csc x \cot x$

$$\int (x^4 - 5x^2 + 3x + 2)\,dx$$

$$= \frac{x^5}{5} - \frac{5x^3}{3} + \frac{3x^2}{2} + \frac{2x^1}{1} + C$$



Knowing one point on the graph of the antiderivative uniquely defines the constant C.