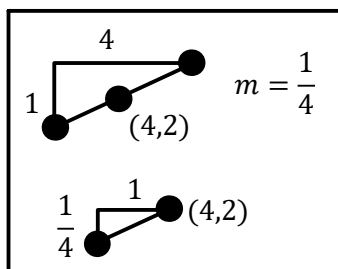
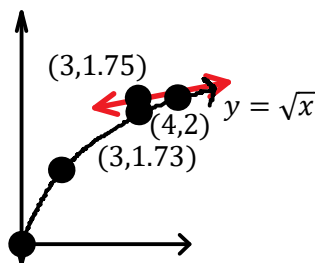


C12 - 2.8 - LinApprox/NewMeth/IVT/MVT Notes

$$\sqrt{3} = ? \quad y = \sqrt{x} \quad (3, y) \quad y = ? \quad \sqrt{4} = 2$$

Slope \times horizontal distance = height



$$y = \sqrt{x}$$

$$y' = \frac{1}{2\sqrt{x}}$$

$$m = \frac{1}{2\sqrt{4}}$$

$$m = \frac{1}{4}$$

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

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

$$L(x) = 2 + \frac{1}{4}(3 - 4)$$

$$L(x) = 2 - \frac{1}{4} \approx 1.75$$

Linear Approximation

Overestimate (concave down.)

$$x^2 = 3$$

$$x^2 - 3 = 0$$

Get = 0

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

Estimate

$$x_1 = 2$$

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

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$

Newton's Method

$$x_2 = 2 - \frac{f(2)}{f'(2)}$$

$$f(x) = x^2 - 3$$

$$f(2) = (2)^2 - 3$$

$$f'(x) = 2x^1$$

$$f'(2) = 2(2)^1$$

$$f(2) = 1$$

$$f'(2) = 4$$

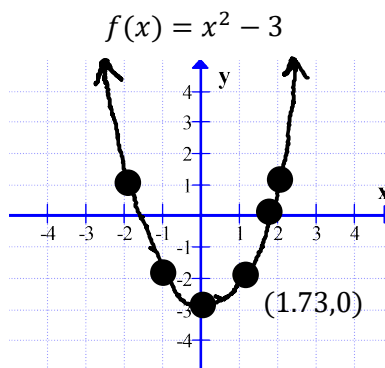
$$x_2 = 1.75$$

$$x_3 = 1.73214$$

$$x_4 = 1.73205$$

REPEAT

Check your Answer $\sqrt{3} = 1.73205$



x	y
0	-3
1	-2
1.73	0
2	1

+ \rightarrow -
OR
- \rightarrow +

Buttons

2 Store x Enter

$(x^2 - 3)$

$x - \frac{(x^2 - 3)}{(2x^1)}$

Store x Enter

TI-84 Up 2nd

TI-83 Up Entry

Up 2nd

Up Entry

Enter Enter

Repeat from Store x*

IVT

$$x^2 = 3 ?$$

$$f(x) = x^2 - 3 = 0$$

$$f(a) \leq f(c) \leq f(b)$$

$$f(1) \leq f(c) \leq f(2)$$

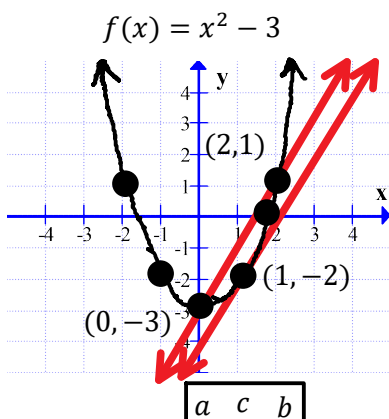
$$-2 \leq 0 \leq 1$$

This should be obvious to you!

There is a value $x = c$ between a and b ; where $f(x) = 0$, & Continuous therefor $x^2 = 3$ must have a solution.

MVT

Tangent Slope = Secant Slope $0 \leq x \leq 2$



This should be obvious to you!

$$y' = m$$

$$y' = \frac{y_2 - y_1}{x_2 - x_1}$$

$$2x = \frac{1 - -3}{2 - 0}$$

$$2x = 2$$

$$x = 1$$

There is a value $x = c$ between a and b ; where $f'(c) = \frac{f(b) - f(a)}{b - a}$, & Continuous [a,b] & Differentiable [a,b].