

Demo of Newton's method.

$$> f := x \rightarrow x^2 - 3$$

$$f := x \rightarrow x^2 - 3$$

$$> F := x \rightarrow x - \frac{(x^2 - 3)}{2 \cdot x}$$

$$F := x \rightarrow x - \frac{1}{2} \frac{x^2 - 3}{x}$$

$$> x0 := 1.5$$

$$x0 := 1.5$$

$$> x1 := F(x0)$$

$$x1 := 1.750000000$$

$$> x2 := F(x1)$$

$$x2 := 1.732142857$$

$$> x3 := F(x2)$$

$$x3 := 1.732050810$$

$$> \text{sqrt}(3.)$$

$$1.732050808$$

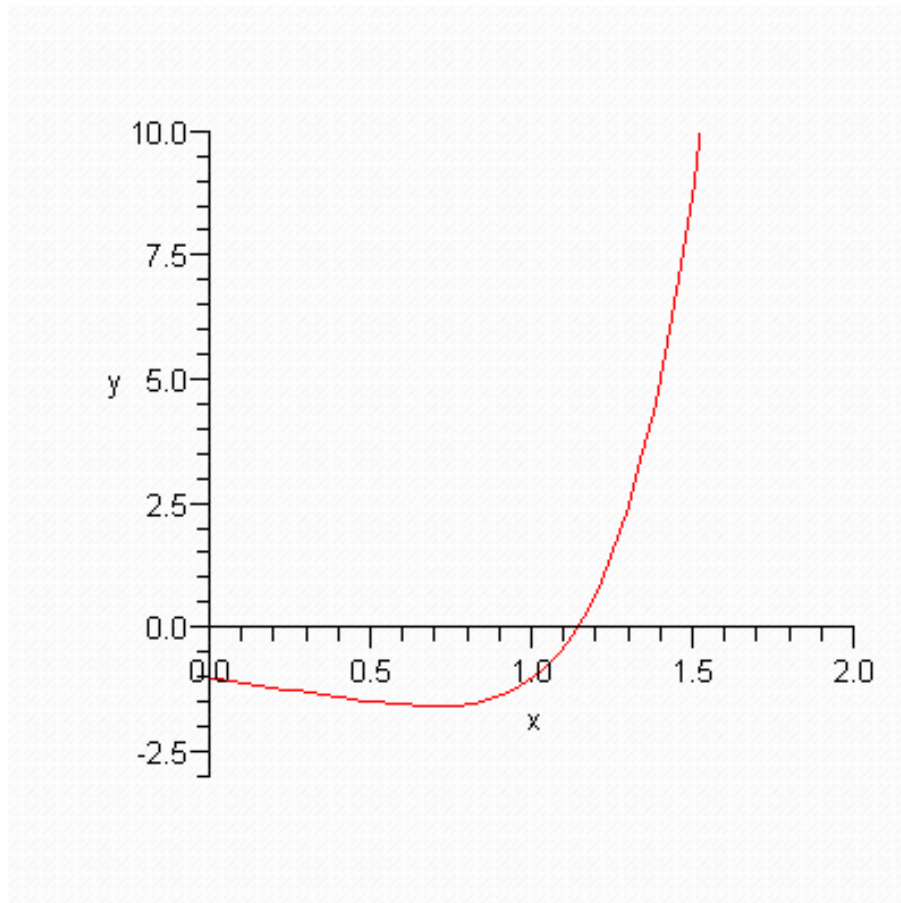
$$> x4 := F(x3)$$

$$x4 := 1.732050808$$

>  $g := x \rightarrow x^6 - x - 1$

$$g := x \rightarrow x^6 - x - 1$$

>  $plot(g(x), x = 0 .. 2, y = -3 .. 10)$



>  $G := x \rightarrow x - \frac{(x^6 - x - 1)}{(6 \cdot x^5 - 1)}$

$$G := x \rightarrow x - \frac{x^6 - x - 1}{6x^5 - 1}$$

>  $x0 := 1.$

$$x0 := 1.$$

>  $x1 := G(x0)$

$x1 := 1.200000000$

>  $x2 := G(x1)$

$x2 := 1.143575842$

>  $x3 := G(x2)$

$x3 := 1.134909462$

>  $x4 := G(x3)$

$x4 := 1.134724221$

>  $x5 := G(x4)$

$x5 := 1.134724138$

>  $x6 := G(x5)$

$x6 := 1.134724138$

>  $f := x \rightarrow \arctan(x) - 1 + 2 \cdot x$

$f := x \rightarrow \arctan(x) - 1 + 2x$

>  $F := x \rightarrow x - \frac{f(x)}{D(f)(x)}$

$F := x \rightarrow x - \frac{f(x)}{(D(f))(x)}$

>  $x0 := 0.$

$x0 := 0.$

>  $x1 := F(x0)$

$x1 := 0.3333333333$

>  $x2 := F(x1)$

$x_2 := 0.3373273950$

>  $x_3 := F(x_2)$

$x_3 := 0.3373288849$

>  $x_4 := F(x_3)$

$x_4 := 0.3373288849$

>