

```
> restart;
```

```
> f := x->x^2-2;
```

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

```
> df := diff(f(x), x);
```

$$df := 2x$$

```
> A := x-f(x)/df;
```

$$A := x - \frac{x^2 - 2}{2x}$$

```
> phi := unapply(A, x);
```

$$\phi := x \rightarrow x - \frac{x^2 - 2}{2x}$$

```
> x0 := 2;
```

$$x0 := 2$$

```
> x1 := phi(x0);
```

$$x1 := \frac{3}{2}$$

```
> x2 := phi(x1);
```

$$x2 := \frac{17}{12}$$

```
> x3 := phi(x2);
```

$$x3 := \frac{577}{408}$$

```
> f(x3);
```

$$\frac{1}{166464}$$

```
> x4 := phi(x3);
```

$$x4 := \frac{665857}{470832}$$

```
> f(x4);
```

$$\frac{1}{221682772224}$$

```
> x5 := phi(x4);
```

$$x5 := \frac{886731088897}{627013566048}$$

```
> f(x5);
```

$$\frac{1}{393146012008229658338304}$$

```
> evalf(x5);
```

1.414213562

```
> evalf(sqrt(2));
```

1.414213562

```
> Digits := 40;
```

*Digits:= 40*

```
> evalf(x5);
```

1.414213562373095048801689623502530243615

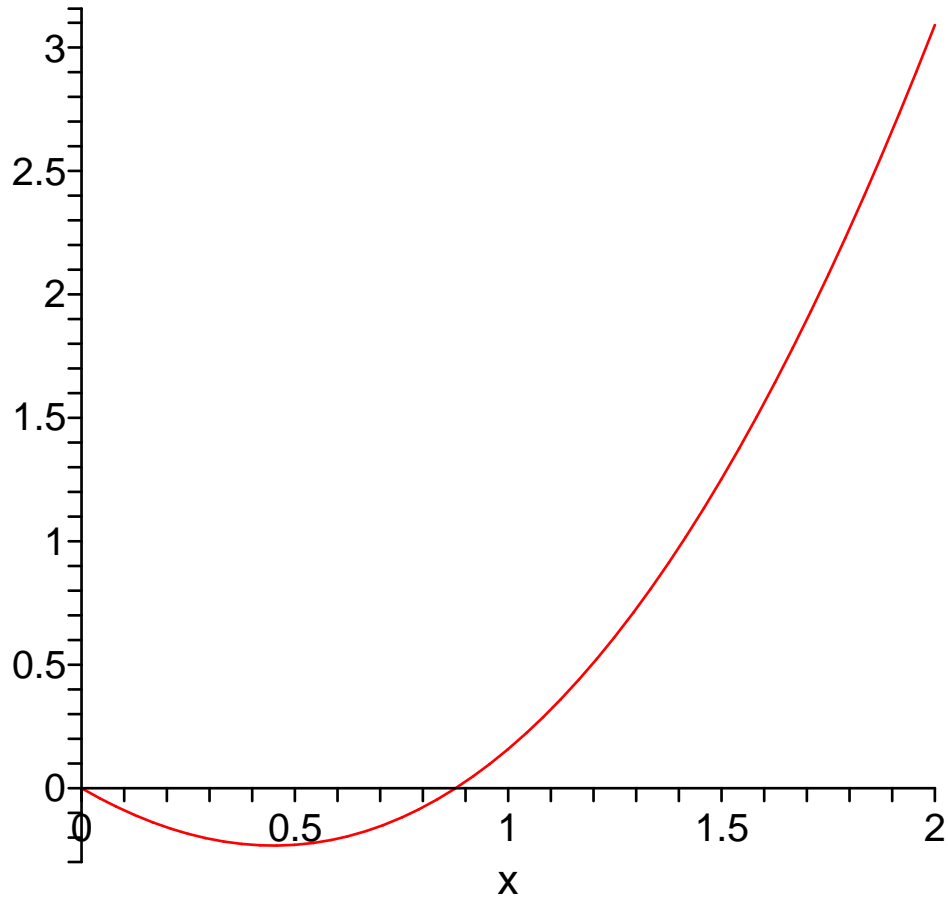
```
> evalf(sqrt(2));
```

1.414213562373095048801688724209698078570

```
> f := x->x^2-sin(x);
```

$$f := x \rightarrow x^2 - \sin(x)$$

```
> plot(f(x), x = 0 .. 2);
```



```
> df := diff(f(x), x);
```

$$df := 2x - \cos(x)$$

```
> A := x-f(x)/df;
```

$$A := x - \frac{x^2 - \sin(x)}{2x - \cos(x)}$$

```
> phi := unapply(A, x);
```

$$\phi := x \rightarrow x - \frac{x^2 - \sin(x)}{2x - \cos(x)}$$

```
> x0 := 1;
```

$$x0 := 1$$

```
> x1 := phi(x0);
```

$$x1 := 1 - \frac{1 - \sin(1)}{2 - \cos(1)}$$

```
> x2 := phi(x1);
```

$$x2 := 1 - \frac{1 - \sin(1)}{2 - \cos(1)} - \frac{\left(1 - \frac{1 - \sin(1)}{2 - \cos(1)}\right)^2 - \sin\left(1 - \frac{1 - \sin(1)}{2 - \cos(1)}\right)}{2 - \frac{2(1 - \sin(1))}{2 - \cos(1)} - \cos\left(1 - \frac{1 - \sin(1)}{2 - \cos(1)}\right)}$$

> **x2a := evalf(x2);**

x2a:= 0.8769848447877435726096548878610401641872

> **x3 := phi(x2a);**

x3:= 0.8767262984818224118419145248427693814870

> **x4 := phi(x3);**

x4:= 0.8767262153950710262520448834841048676091

> **x5 := phi(x4);**

x5:= 0.8767262153950624459721186432334322932842

> **x6 := phi(x5);**

x6:= 0.8767262153950624459721186431419281399718

>