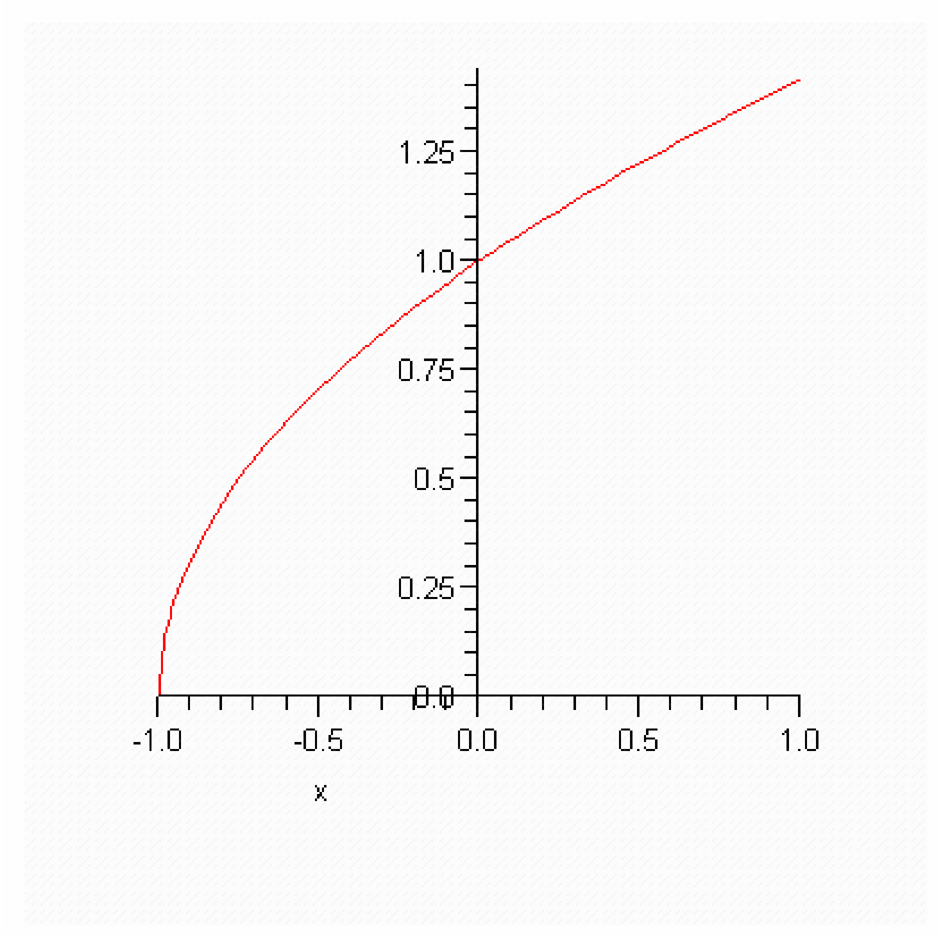
Linearization demo.

> $f := x \rightarrow (1+x)^{\left(\frac{1}{2}\right)}$

$$f := x \rightarrow \sqrt{1+x}$$

> $plot(f(x), x = -1..1)$



> $fp := D(f)(x)$

$$fp := \frac{1}{2} \frac{1}{\sqrt{1+x}}$$

> $fp(3.)$

$$\frac{1}{2}\frac{1}{\sqrt{1+x(3.)}}$$

> $D(f)(3.)$

0
.2500000000

> $D(f)(5.)$

0
.2041241452

> $L := x \rightarrow f(0)$
$+ D(f)(0) \cdot (x - 0)$

$$L := x \rightarrow f(0) + (\mathrm{D}(f))(0)\, x$$

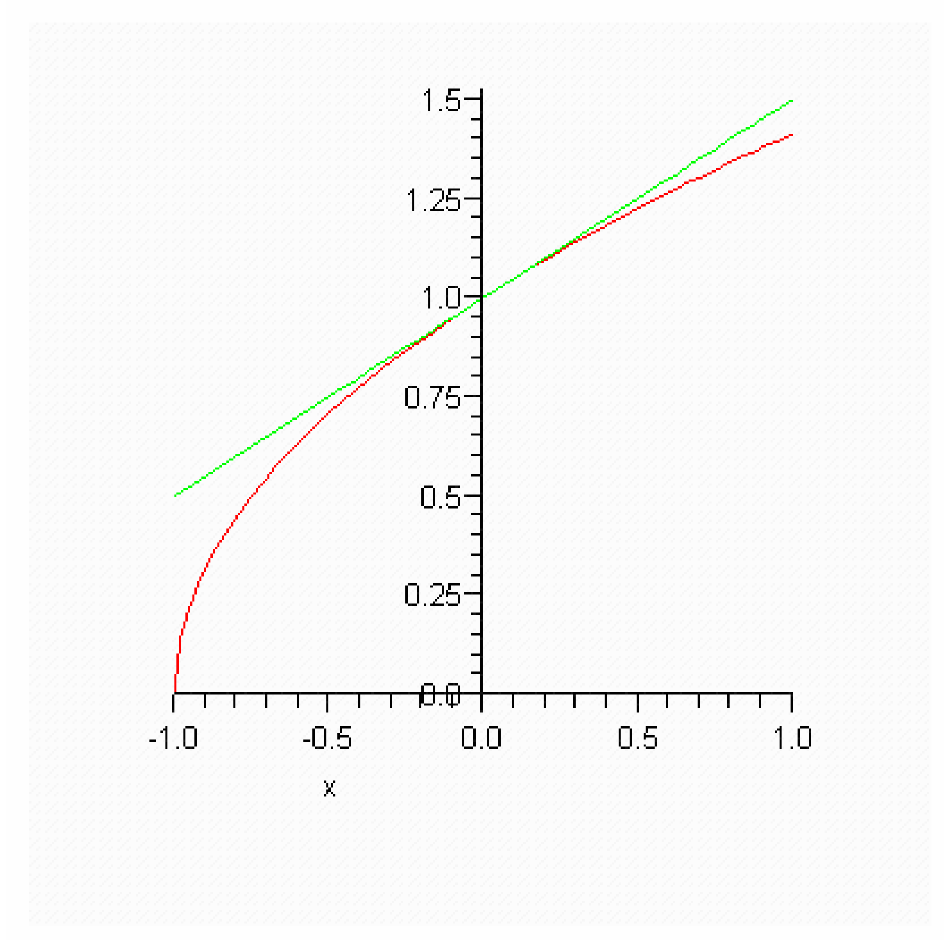
> $L(3)$

$$\frac{5}{2}$$

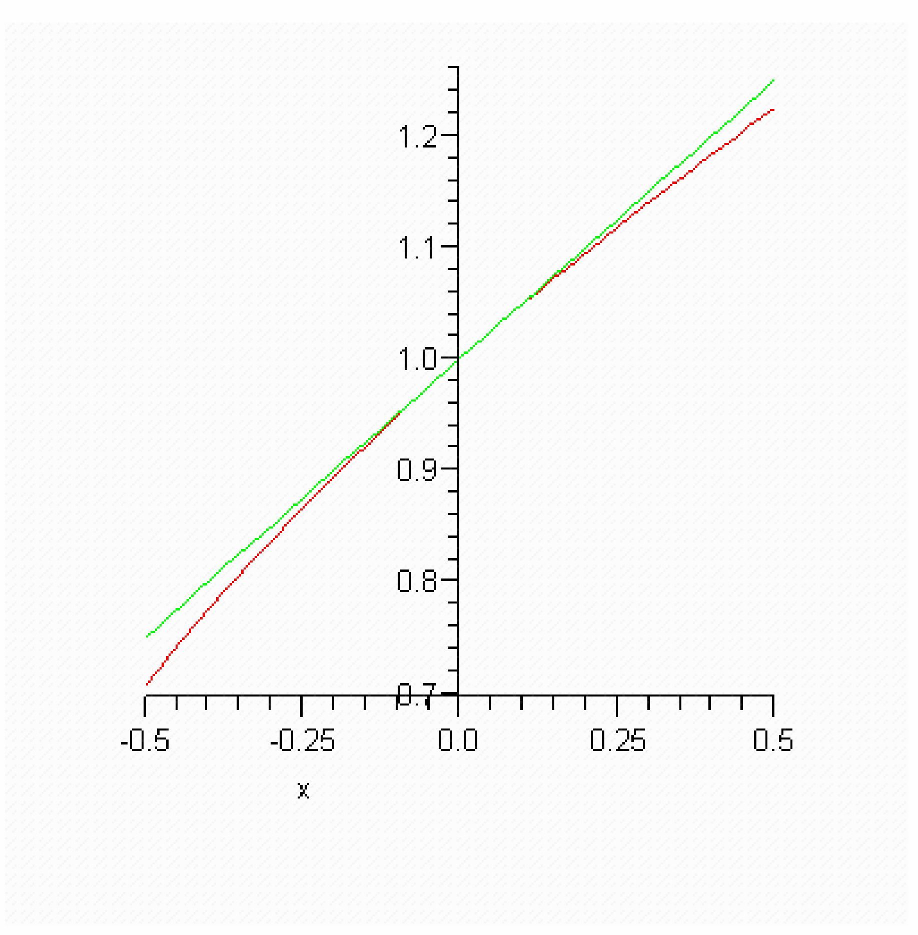
> $L(3.)$

2
.500000000

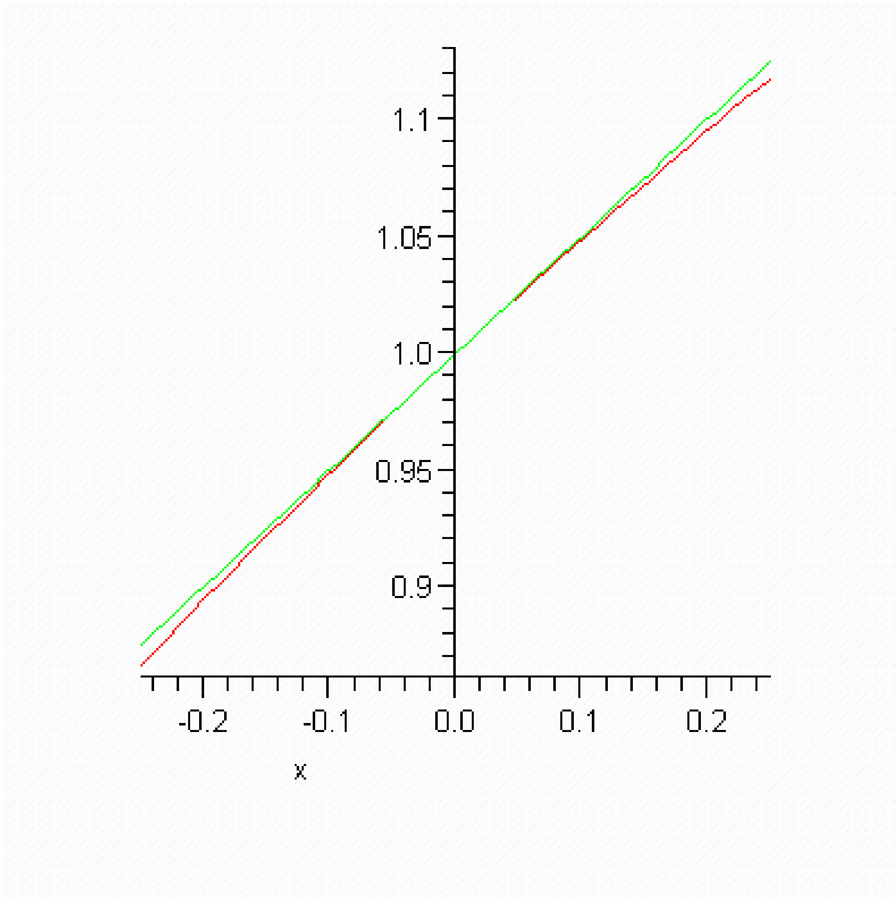
> $plot([f(x), L(x)], x = -1..1)$



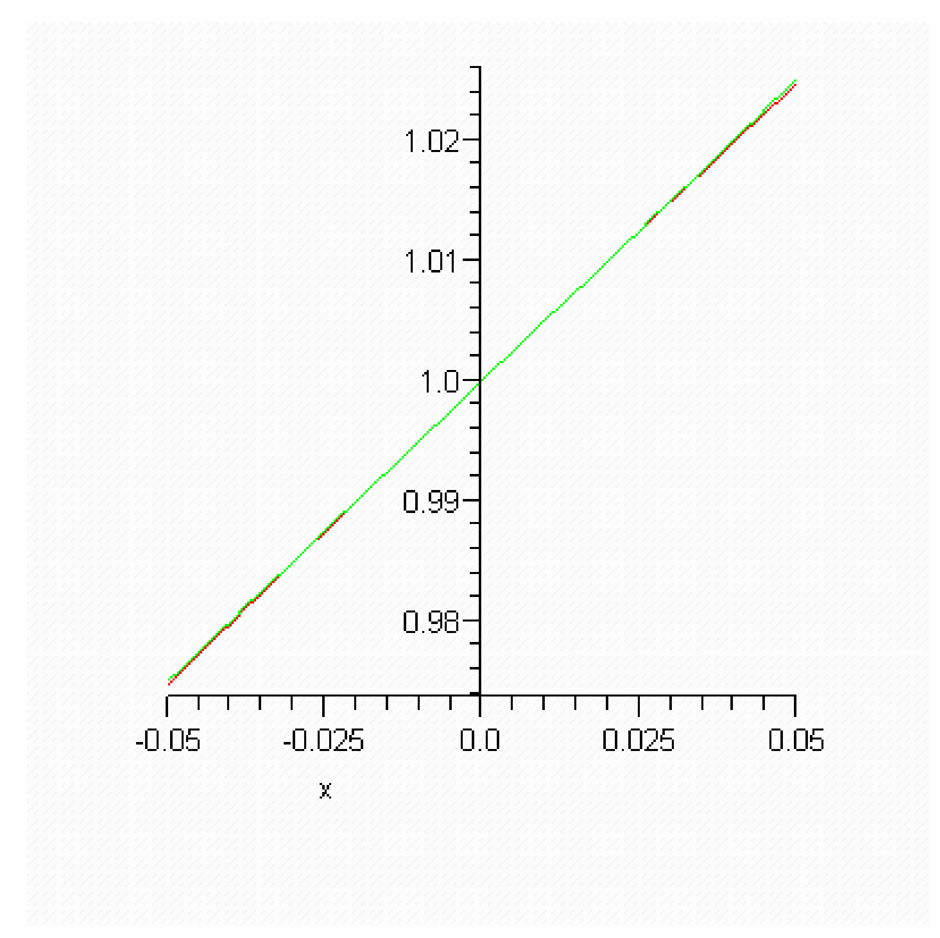
> $plot([f(x), L(x)], x = -.5 .. .5)$



> $plot([f(x), L(x)], x = -.25 .. .25)$



> $plot([f(x), L(x)], x = -.05 .. .05)$



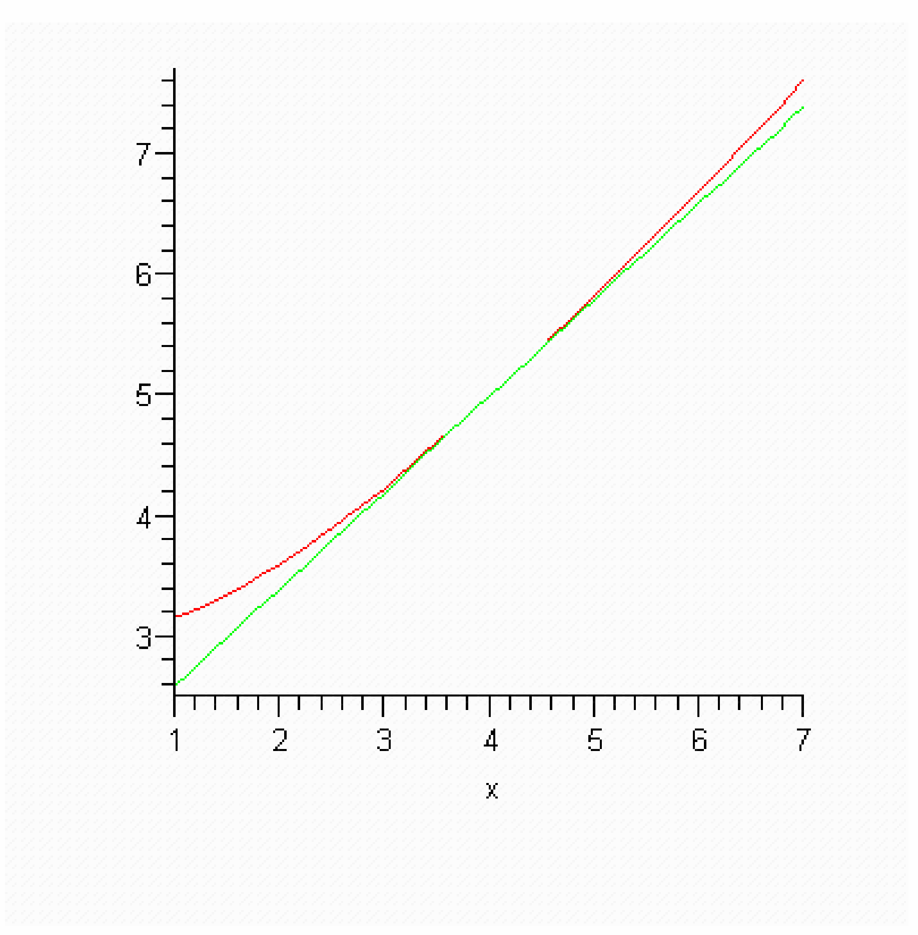
> $g := x \rightarrow (x^2 + 9)^{\left(\frac{1}{2}\right)}$

$$g := x \rightarrow \sqrt{x^2 + 9}$$

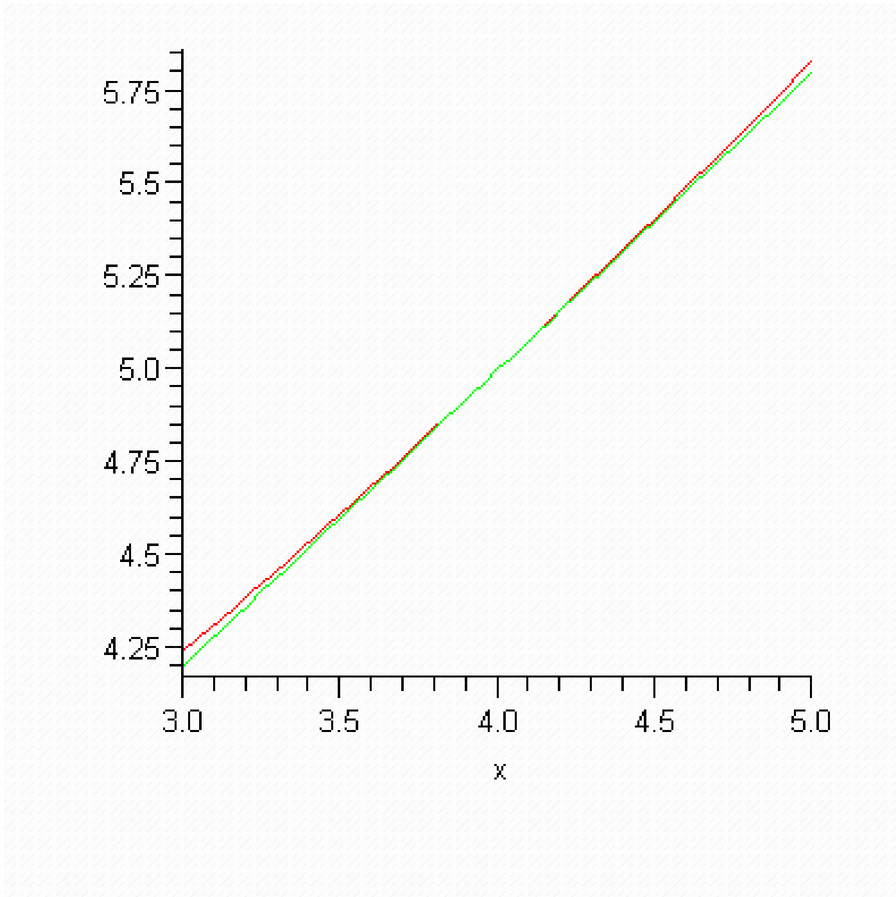
> $L := x \rightarrow \left(\frac{4}{5}\right) \cdot x + \left(\frac{9}{5}\right)$

$$L := x \rightarrow \frac{4}{5}\,x + \frac{9}{5}$$

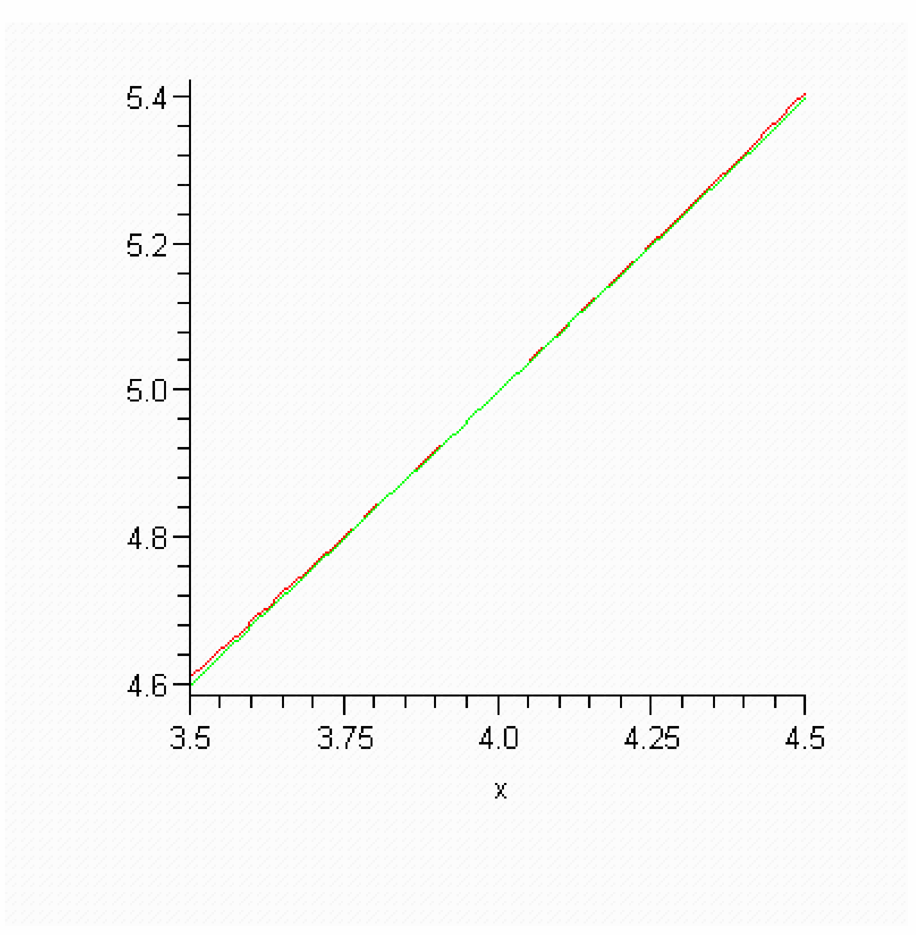
> $plot(\,[g(x), L(x)\,], x = 1\,..7)$



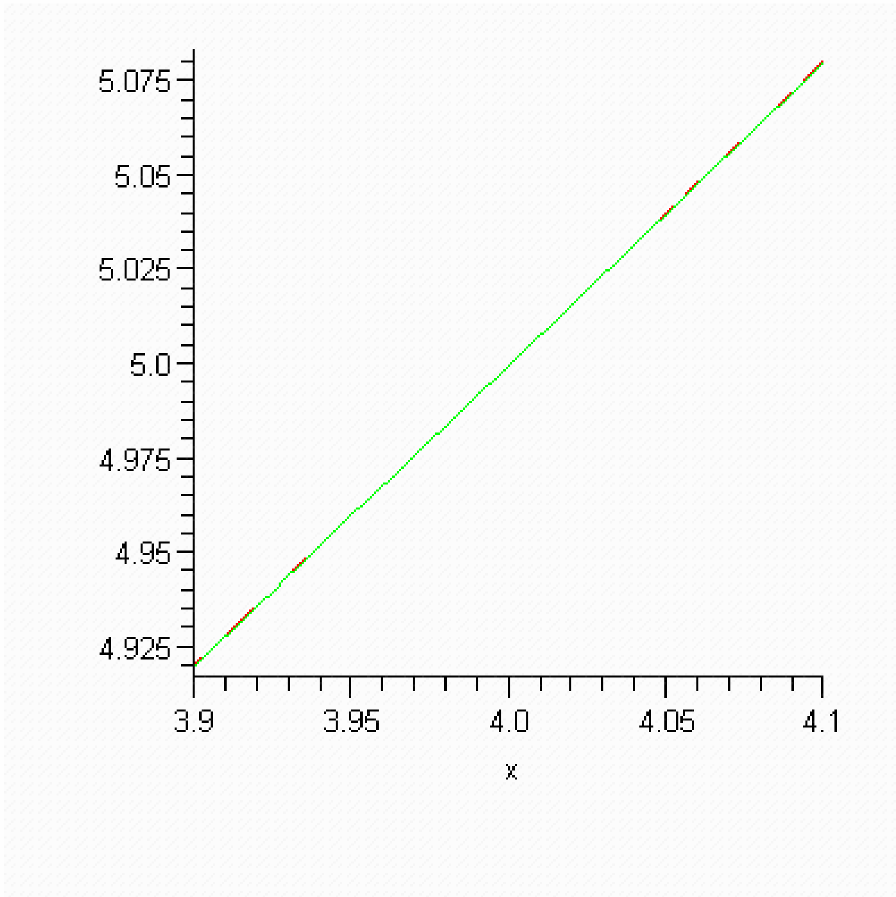
> $plot([g(x), L(x)], x = 3..5)$



> $plot([g(x), L(x)], x = 3.5 ..4.5)$



> $plot([g(x), L(x)], x = 3.9 ..4.1)$



> $f(x)$

$$\sqrt{1+x}$$

> $f(.2)$

1
.095445115

> $L := x \rightarrow \left(\frac{1}{2}\right) \cdot x + 1$

$$L := x \rightarrow \frac{1}{2}\,x + 1$$

> $abs(f(.2) - L(.2))$

0
.004554885

> $\frac{abs(f(.2)-L(.2))}{abs(f(.2))}$

0
.004158022102

> $f(.5)$

1
.224744871

> $L(.5)$

1
.250000000

> $abs(f(.5)-L(.5))$

0
.025255129

> $\frac{abs(f(.5)-L(.5))}{abs(f(.5))}$

0
.02062072649

> $\frac{Pi}{12}$

$$\frac{1}{12}\pi$$

> $arcsin\left(\frac{Pi}{12}\right)$

$$\arcsin\left(\frac{1}{12}\pi\right)$$

> $evalf(\%)$

0
.2648861470

> $evalf\left(\frac{abs\left(arcsin\left(\frac{Pi}{12}\right)-\left(\frac{Pi}{12}\right)\right)}{abs\left(arcsin\left(\frac{Pi}{12}\right)\right)}\right)$

0
.01165315452

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