

[501)

> restart

>  $f := x \rightarrow x^3 + 2x \cdot \sin(x)$

$f := x \rightarrow x^3 + 2x \sin(x)$

(1)

>  $f1 := D(f)$

$f1 := x \rightarrow 3x^2 + 2 \sin(x) + 2x \cos(x)$

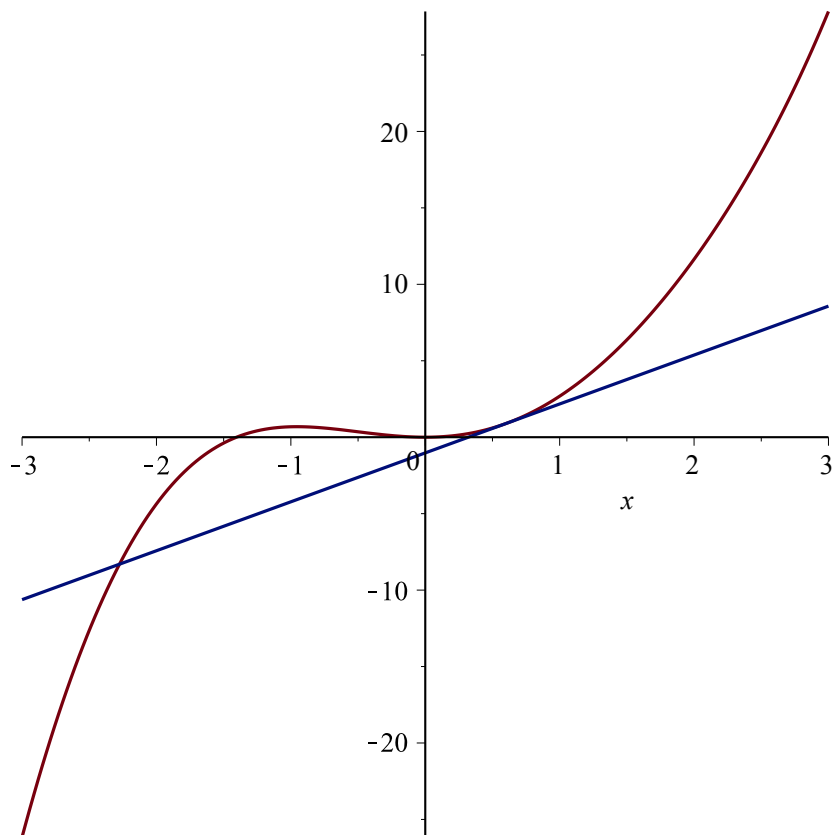
(2)

>  $t := x \rightarrow f(0.6) + f1(0.6) \cdot (x - 0.6)$

$t := x \rightarrow f(0.6) + f1(0.6) (x - 0.6)$

(3)

>  $plot([f(x), t(x)], x = -3..3)$



[502)

> restart

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

$f := x \rightarrow \sin\left(\frac{1}{x}\right)$

(4)

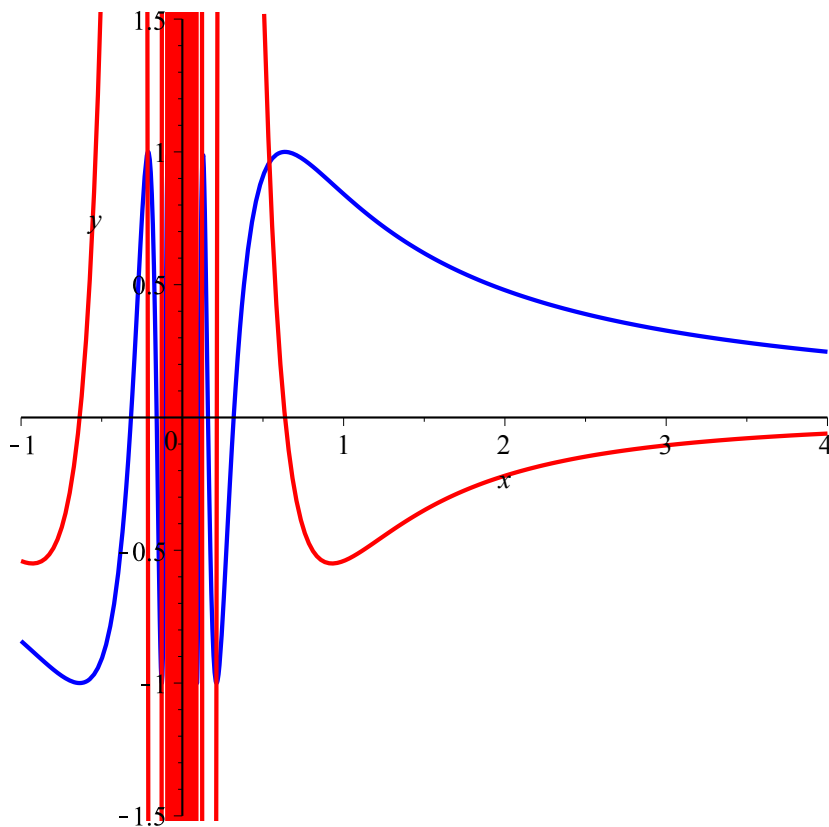
>  $f1 := D(f)$

(5)

$$f1 := x \rightarrow -\frac{\cos\left(\frac{1}{x}\right)}{x^2}$$

(5)

> plot([f(x), f1(x)], x=-1..4, y=-1.5..1.5, color=[blue, red], thickness=2)



503)

> restart

> f := x → x · (x - 3) · exp(-x)

$$f := x \rightarrow x (x - 3) e^{-x}$$

(6)

> f1 := D(f)

$$f1 := x \rightarrow (x - 3) e^{-x} + x e^{-x} - x (x - 3) e^{-x}$$

(7)

> f2 := D(f1)

$$f2 := x \rightarrow 2 e^{-x} - 2 (x - 3) e^{-x} - 2 x e^{-x} + x (x - 3) e^{-x}$$

(8)

> p := solve(f1(x) = 0, x)

$$p := \frac{5}{2} + \frac{1}{2} \sqrt{13}, \frac{5}{2} - \frac{1}{2} \sqrt{13}$$

(9)

> evalf(p)

$$4.302775638, 0.697224362$$

(10)

```
> evalf(f2(p[1]))
```

-0.04878653336 (11)

```
> evalf(f2(p[2]))
```

1.795440359 (12)

```
504)
```

```
> restart
```

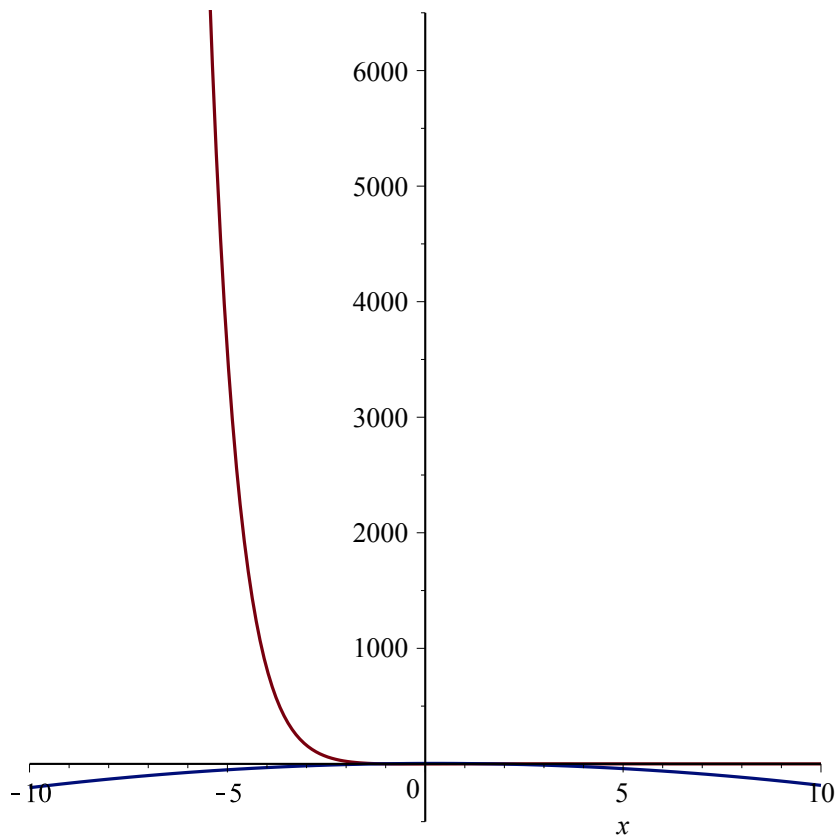
```
> f:=x→(x2−1)·exp(−x)
```

$f:=x \rightarrow (x^2 - 1) e^{-x}$  (13)

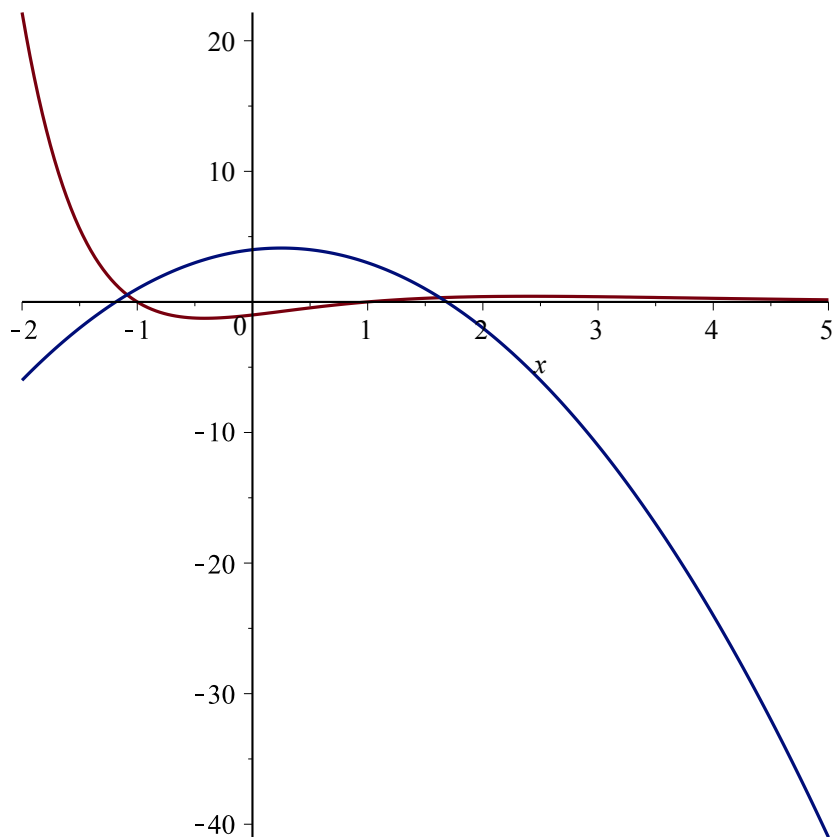
```
> g:=x→−2x2+x+4
```

$g:=x \rightarrow -2x^2 + x + 4$  (14)

```
> plot([f(x),g(x)])
```



```
> plot([f(x),g(x)],x=-2..5)
```



```
> fsolve(f(x) = g(x), x, x = -2..0)
-1.087927070 (15)
```

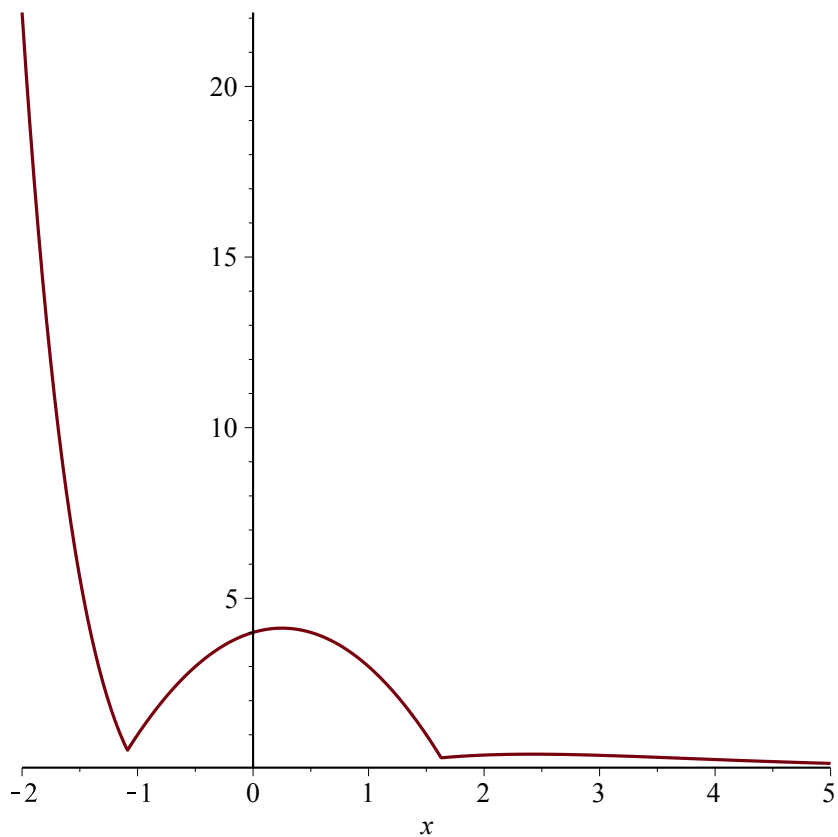
```
> fsolve(f(x) = g(x), x, x = 0..5)
1.628553450 (16)
```

```
> px := [fsolve(f(x) = g(x), x, x = -2..0), fsolve(f(x) = g(x), x, x = 0..5)]
px := [-1.087927070, 1.628553450] (17)
```

```
> py := [f(px[1]), f(px[2])]
py := [0.5449023117, 0.3241807706] (18)
```

```
> h := x -> piecewise(x < px[1], f(x), x < px[2], g(x), f(x))
h := x -> piecewise(x < px_1, f(x), x < px_2, g(x), f(x)) (19)
```

```
> plot(h(x), x = -2..5)
```



```
> int(abs(f(x) - g(x)), x = px[1]..px[2])
9.195048998 (20)
```

```
505)
```

```
> restart
> Digits := 3
Digits := 3 (21)
```

```
> f := x → a·x3 + b·x2 + c·x + d
f := x → a x3 + b x2 + c x + d (22)
```

```
> solve({f(-1.0) = 14.4, f(0.0) = 10.0, f(1.0) = 9.6, f(2.0) = 19.8}, {a, b, c, d})
{a = 1.10, b = 2., c = -3.50, d = 10.} (23)
```

```
> assign(%)
> solve(f(x) = 0, x)
0.832 + 1.39 I, -3.48, 0.832 - 1.39 I (24)
```

```
> fsolve(f(x) = 0, x)
-3.48 (25)
```

```
> f1 := D(f)
f1 := x → 3 a x2 + 2 b x + c (26)
```

```
> f2 := D(f1)
f2 := x → 6 a x + 2 b (27)
```

```
> pmx := solve(f1(x) = 0, x)
pmx := 0.589, -1.80 (28)
```

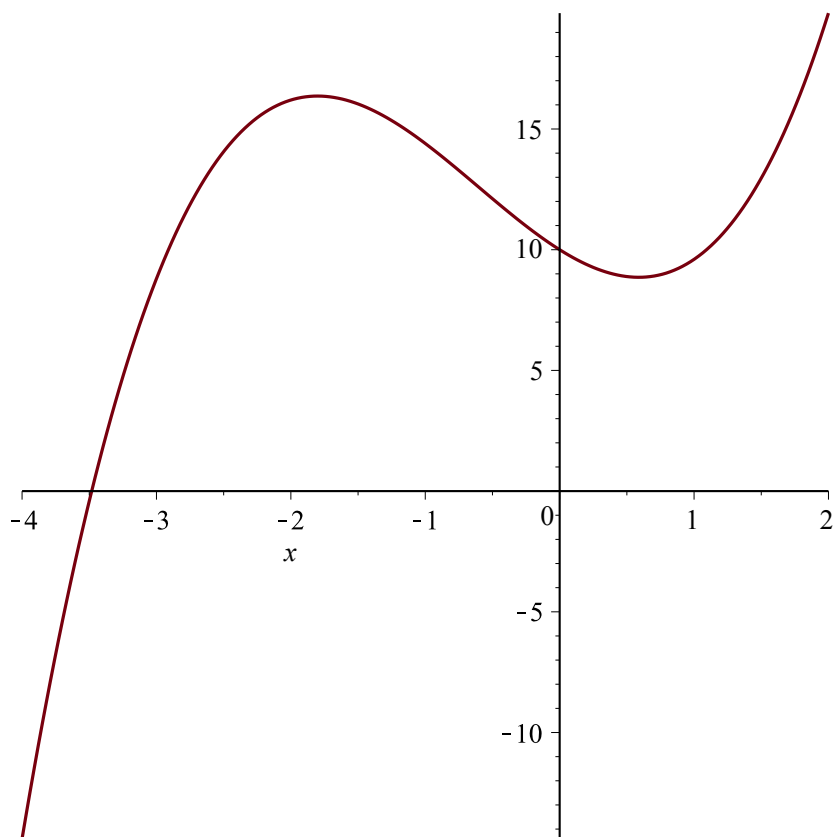
```
> pmy := [f(pmx[1]), f(pmx[2])]
pmy := [8.86, 16.4] (29)
```

```
> f2(pmx[1]), f2(pmx[2])
7.89, -7.9 (30)
```

```
> pmin := [pmx[1], pmy[1]]
pmin := [0.589, 8.86] (31)
```

```
> pmax := [pmx[2], pmy[2]]
pmax := [-1.80, 16.4] (32)
```

```
> plot(f(x), x = -4..2)
```



```
>
```