```
> 2 + 2;
```
$$4 \tag{1}$$
```
> (x^2 + 5)·(x^2 - 5)
```
$$(x^2 + 5)(x^2 - 5) \tag{2}$$
```
> expand(%);
```
$$x^4 - 25 \tag{3}$$
```
> factor(%);
```
$$(x^2 + 5)(x^2 - 5) \tag{4}$$
```
> (x + sqrt(5))·(x - sqrt(5))·(x^2 + 5);
```
$$(x + \sqrt{5})(x - \sqrt{5})(x^2 + 5) \tag{5}$$
```
>
```

Hey. Now I'm gonna do something.

In maple we write the sine as
```
> sin(x);
```
$$\sin(x) \tag{6}$$
In mathematica it is Sin[x]

A loop in maple is
```
> for i from 1 to 5 do
    i^2;
  end do;
```
$$1$$
$$4$$
$$9$$
$$16$$
$$25 \tag{7}$$
In Mathematica the syntax is a little less "natural" (although makes perfect sense, once you look at it)
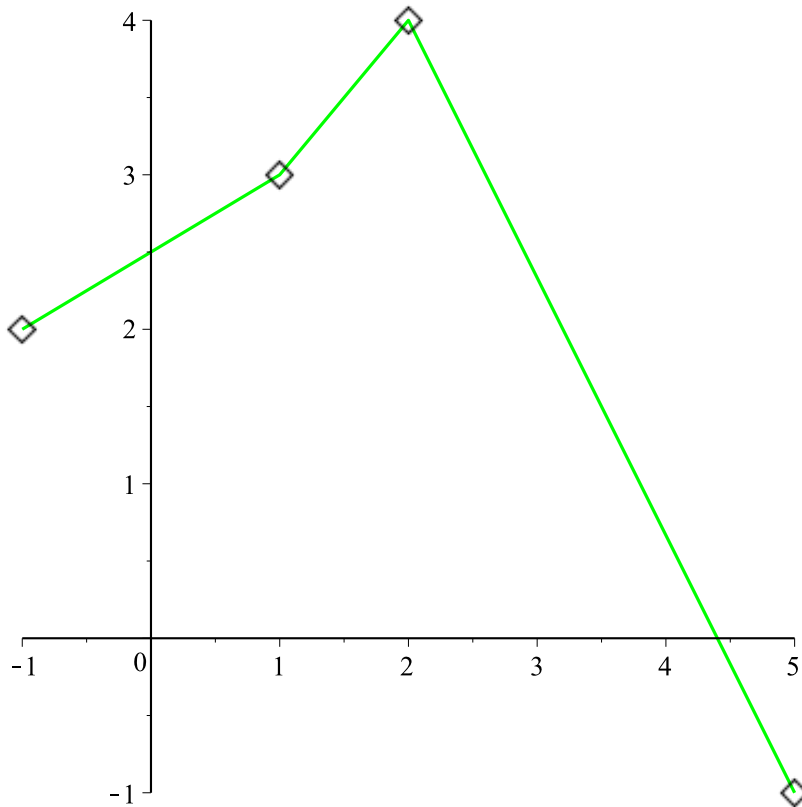 Do[i^2, {i, 5}]
anyway...
```
>
>
> data := [[-1, 2], [1, 3], [2, 4], [5, -1]];
```
$$data := [[-1, 2], [1, 3], [2, 4], [5, -1]] \tag{8}$$
```
> plot([data, data], style = [line, point], color = [green, black], symbolsize = 25);
```

Want the unique degree 3 curve thru those 4 points.
an arrow is ->

> $f := x \rightarrow a \cdot x^3 + b \cdot x^2 + c \cdot x + d;$

$$f := x \rightarrow a\,x^3 + b\,x^2 + c\,x + d \tag{9}$$

> $solve([f(-1)=2, f(1)=3, f(2)=4, f(5)=-1]);$

$$\left\{ a = -\frac{5}{36}, b = \frac{4}{9}, c = \frac{23}{36}, d = \frac{37}{18} \right\} \tag{10}$$

> $g := a \cdot x^3 + b \cdot x^2 + c \cdot x + d;$

$$g := a\,x^3 + b\,x^2 + c\,x + d \tag{11}$$

> $g(1);$

$$a(1)\,x(1)^3 + b(1)\,x(1)^2 + c(1)\,x(1) + d(1) \tag{12}$$

> $f(1);$

$$a + b + c + d \tag{13}$$

> $h := (x, y) \rightarrow \sin(x) \cdot \cos(y);$

$$h := (x, y) \rightarrow \sin(x)\,\cos(y) \tag{14}$$

> $h(2, rabbit);$
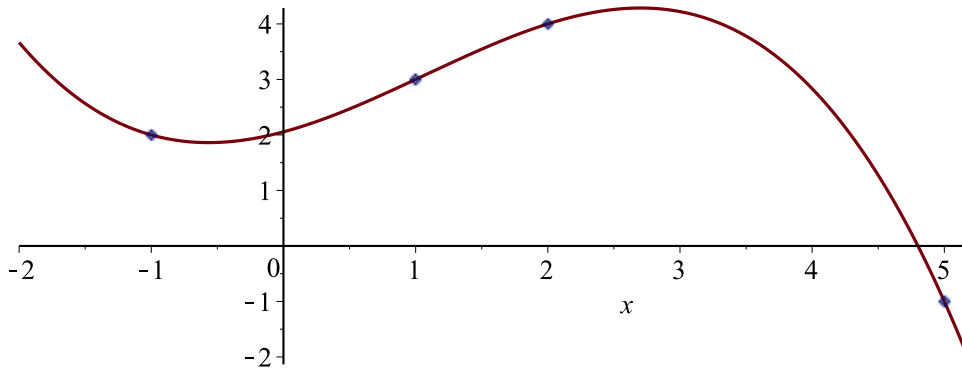
$$\sin(2)\,\cos(rabbit) \tag{15}$$

> $sols := solve([f(-1) = 2, f(1) = 3, f(2) = 4, f(5) = -1])$;

$$sols := \left\{ a = -\frac{5}{36}, b = \frac{4}{9}, c = \frac{23}{36}, d = \frac{37}{18} \right\}$$ (16)

> $f(x)$;

$$a x^3 + b x^2 + c x + d$$ (17)

> $F(x)$;

$$F(x)$$ (18)

> $F := x \rightarrow -\frac{5}{36} \cdot x^3 + \frac{4}{9} \cdot x^2 + \frac{23}{36} \cdot x + \frac{37}{18}$;

$$F := x \rightarrow -\frac{5}{36} x^3 + \frac{4}{9} x^2 + \frac{23}{36} x + \frac{37}{18}$$ (19)

> $plot([F(x), data], x = -2 .. 5.2, style = [line, point])$;

> $f(x), sols$;

$$a x^3 + b x^2 + c x + d, \left\{ a = -\frac{5}{36}, b = \frac{4}{9}, c = \frac{23}{36}, d = \frac{37}{18} \right\}$$ (20)

> $subs(x = 5, 3 \cdot x^{2 \cdot y})$;

$$3 \cdot 5^{2y}$$ (21)

> $subs(sols, f(x))$;

$$-\frac{5}{36} x^3 + \frac{4}{9} x^2 + \frac{23}{36} x + \frac{37}{18}$$ (22)

> a;

$$a$$ (23)

> $g := subs(sols, f(x))$;

$$g := -\frac{5}{36} x^3 + \frac{4}{9} x^2 + \frac{23}{36} x + \frac{37}{18}$$ (24)

> $g(2)$;

$$-\frac{5}{36} x(2)^3 + \frac{4}{9} x(2)^2 + \frac{23}{36} x(2) + \frac{37}{18}$$ (25)

> $g := x \rightarrow subs(sols, f(x))$;

$$g := x \rightarrow subs(sols, f(x))$$ (26)

> $g(2)$;

$$4$$ (27)

> $sols := \{a = 7\};$
$$sols := \{a = 7\} \qquad (28)$$

> $g(2);$
$$56 + 4\,b + 2\,c + d \qquad (29)$$

> $sols := solve([f(-1) = 2, f(1) = 3, f(2) = 4, f(5) = -1]);$
$$sols := \left\{ a = -\frac{5}{36},\, b = \frac{4}{9},\, c = \frac{23}{36},\, d = \frac{37}{18} \right\} \qquad (30)$$

> $g := unapply(subs(sols, f(x)), x);$
$$g := x \rightarrow -\frac{5}{36}\,x^3 + \frac{4}{9}\,x^2 + \frac{23}{36}\,x + \frac{37}{18} \qquad (31)$$

>

unapply transforms an expression into a function.

> $f(x);$
$$a\,x^3 + b\,x^2 + c\,x + d \qquad (32)$$

> $F(x);$
$$-\frac{5}{36}\,x^3 + \frac{4}{9}\,x^2 + \frac{23}{36}\,x + \frac{37}{18} \qquad (33)$$

> $g(x);$
$$-\frac{5}{36}\,x^3 + \frac{4}{9}\,x^2 + \frac{23}{36}\,x + \frac{37}{18} \qquad (34)$$

I want a from now on to BE -5/36;

> $assign(sols);$
> $a;$
$$-\frac{5}{36} \qquad (35)$$

> $f(x);$
$$-\frac{5}{36}\,x^3 + \frac{4}{9}\,x^2 + \frac{23}{36}\,x + \frac{37}{18} \qquad (36)$$

> $a := 3;$
$$a := 3 \qquad (37)$$

> $f(x);$
$$3\,x^3 + \frac{4}{9}\,x^2 + \frac{23}{36}\,x + \frac{37}{18} \qquad (38)$$

> $unassign('a','b','c','d');$
> $a;$
$$a \qquad (39)$$

> $f(x);$
$$a\,x^3 + b\,x^2 + c\,x + d \qquad (40)$$

> $data;$
$$[[-1, 2], [1, 3], [2, 4], [5, -1]] \qquad (41)$$

> $henry := [[1, 3], [2, 4], [5, 6], [6, -2]];$
$$henry := [[1, 3], [2, 4], [5, 6], [6, -2]] \qquad (42)$$

Want something that when given [1,3] gives me f(1)=3.

> $f(henry[1][1]) = henry[1][2]; f(henry[2][1]) = henry[2][2];$

$$a + b + c + d = 3$$

$$8\,a + 4\,b + 2\,c + d = 4 \tag{43}$$

> $doit := p \rightarrow f(p[1]) = p[2];$

$$doit := p \rightarrow f(p_1) = p_2 \tag{44}$$

> $doit(henry[1]);$

$$a + b + c + d = 3 \tag{45}$$

> $doit(henry[2]);$

$$8\,a + 4\,b + 2\,c + d = 4 \tag{46}$$

> $seq(i^2, i = 1..4);$

$$1, 4, 9, 16 \tag{47}$$

> $seq(doit(henry[i]), i = 1..4);$

$$a + b + c + d = 3, 8\,a + 4\,b + 2\,c + d = 4, 125\,a + 25\,b + 5\,c + d = 6, 216\,a + 36\,b + 6\,c + d \tag{48}$$
$$= -2$$

> $solve(\ [seq(doit(henry[i]), i = 1..4)]\ );$

$$\left\{ a = -\frac{5}{12}, b = \frac{13}{4}, c = -\frac{35}{6}, d = 6 \right\} \tag{49}$$

> $subs(solve(\ [seq(doit(henry[i]), i = 1..4)]\ ), f(x));$

$$-\frac{5}{12}\,x^3 + \frac{13}{4}\,x^2 - \frac{35}{6}\,x + 6 \tag{50}$$

>
>