Jan 31, 2012

```
> factor(x^2-2);
```

$$x^2 - 2 \tag{1}$$

hey. That isn't what I meant. I ***expected*** to see something like $(x-\sqrt{2})(x+\sqrt{2})$

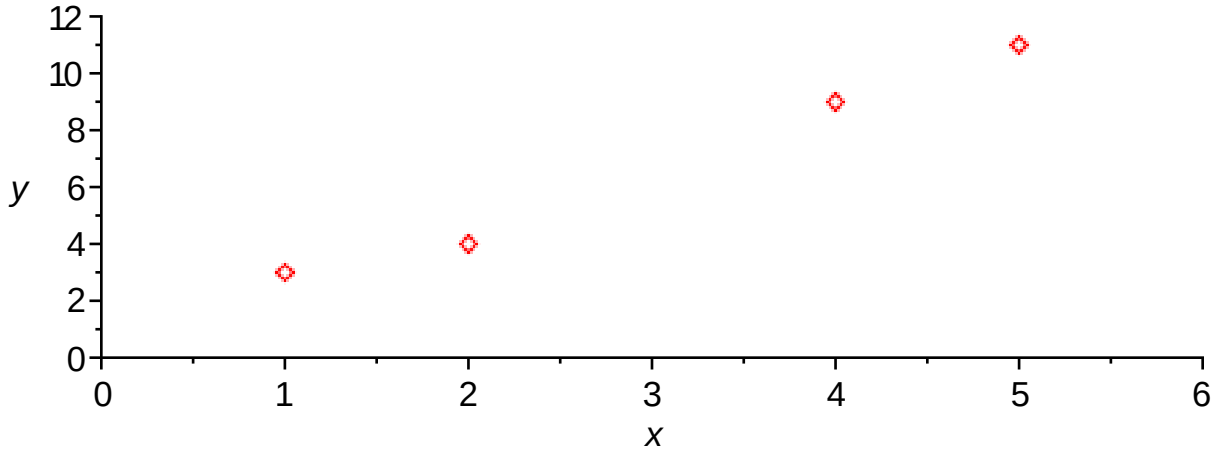
```
> sqrt(2);
```

$$\sqrt{2} \tag{2}$$

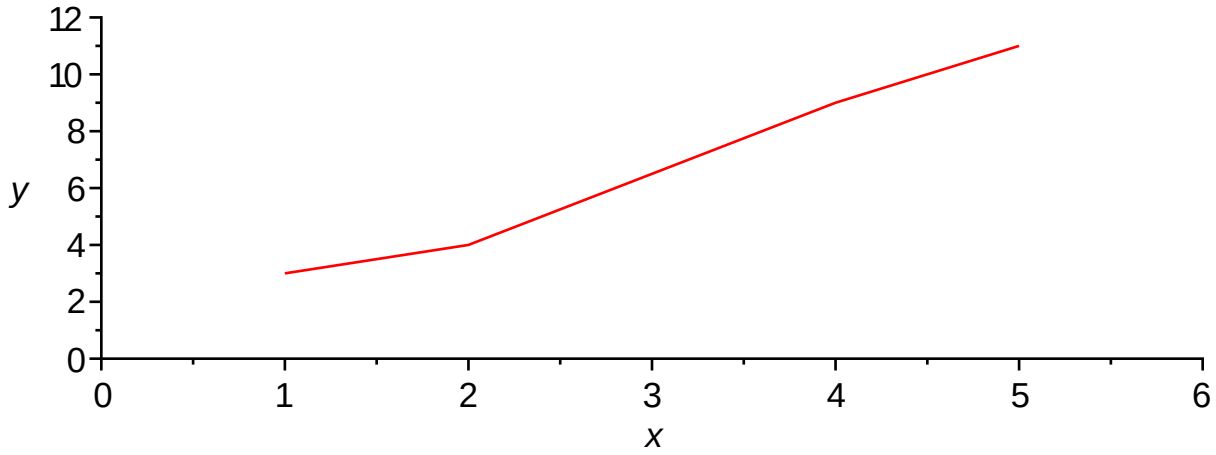
```
> dat:= [[1,3],[2,4],[4,9],[5,11]];
```

$$dat := [[1, 3], [2, 4], [4, 9], [5, 11]] \tag{3}$$

```
> plot(dat,x=0..6,y=0..12,style=point,symbolsize=18);
```




```
> not what I want
> plot(dat,x=0..6,y=0..12,symbolsize=18);
```




```
> f:=x->a*x^3 + b*x^2 + c*x +d;
```

$$f := x \to a\,x^3 + b\,x^2 + c\,x + d \tag{4}$$

```
> f(1)=3;
```

$$a + b + c + d = 3 \tag{5}$$

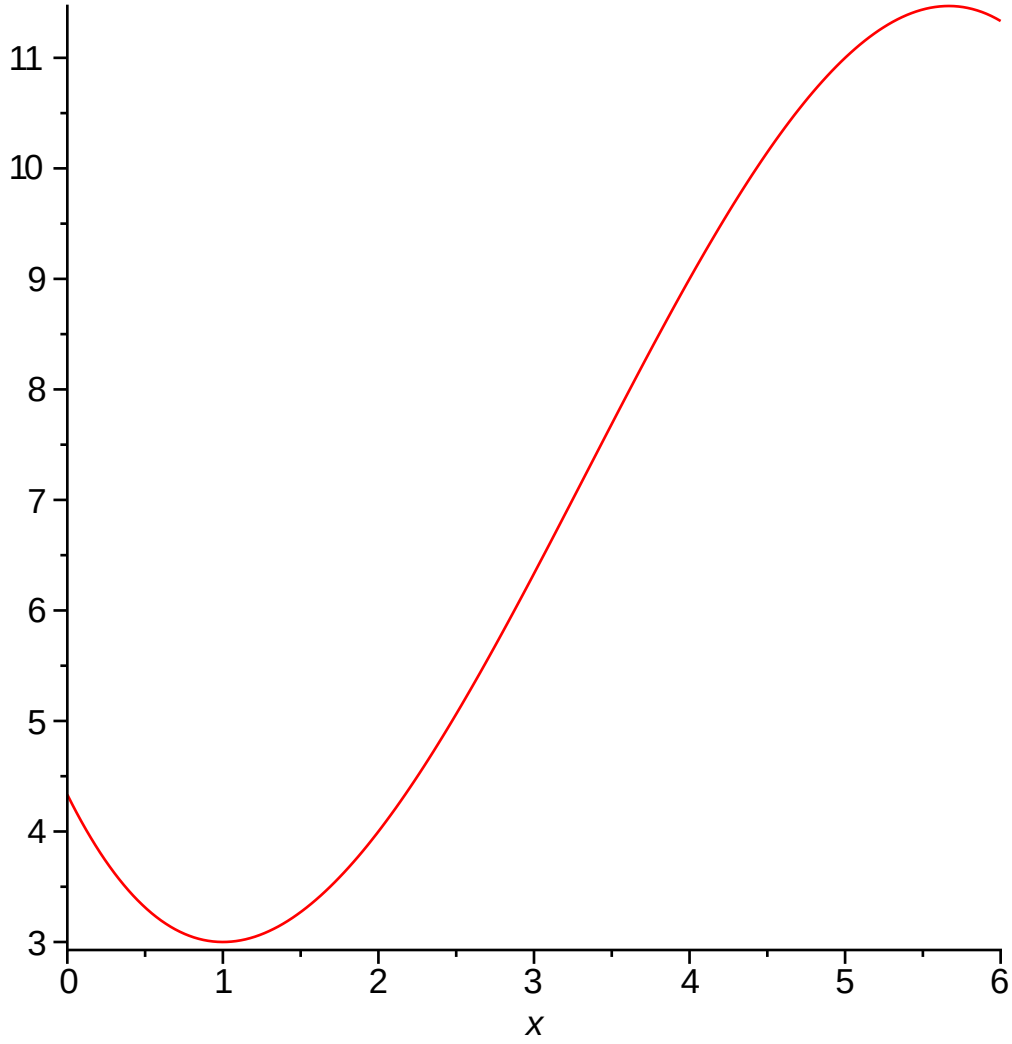
```
> coef:=solve({f(1)=3, f(2)=4, f(4)=9, f(5)=11}, {a,b,c,d});
```

$$coef := \left\{a = -\frac{1}{6},\ b = \frac{5}{3},\ c = -\frac{17}{6},\ d = \frac{13}{3}\right\} \tag{6}$$

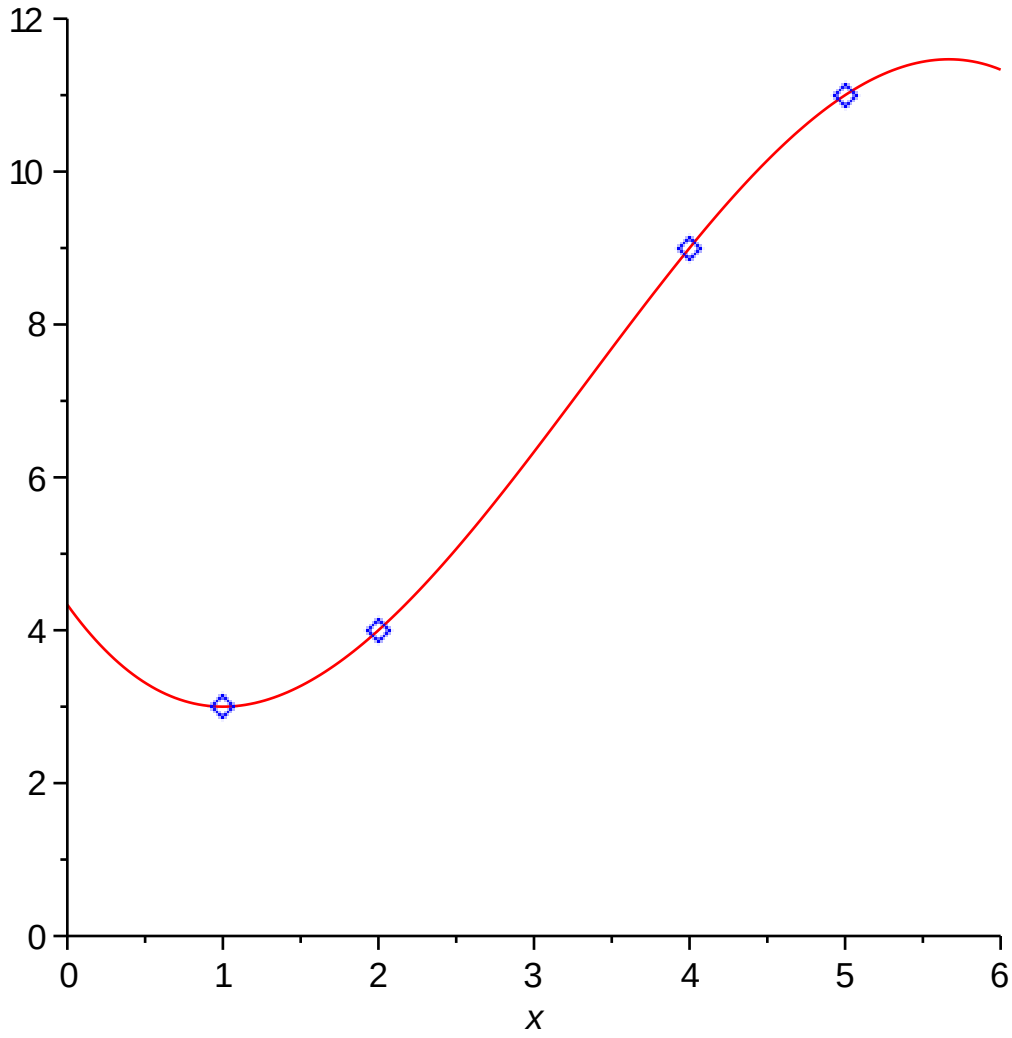
```
> p:=subs(coef,f(x));
```

$$p := -\frac{1}{6}x^3 + \frac{5}{3}x^2 - \frac{17}{6}x + \frac{13}{3} \quad (7)$$

```
> plot(p,x=0..6);
```




```
> plots[display]( {plot(p,x=0..6),
                   plot(dat,x=0..6,y=0..12,
                   symbolsize=18,style=point,color=blue)});
```




```
> with(plots):
  with(CurveFitting);
```

$$[ArrayInterpolation, BSpline, BSplineCurve, Interactive, LeastSquares, PolynomialInterpolation, RationalInterpolation, Spline, ThieleInterpolation] \quad (8)$$

```
> PolynomialInterpolation(dat,x);
```

$$-\frac{1}{6}x^3+\frac{5}{3}x^2-\frac{17}{6}x+\frac{13}{3} \quad (9)$$

```
> stuff:= seq( i^2, i=0..20, 2);
```

$$stuff := 0, 4, 16, 36, 64, 100, 144, 196, 256, 324, 400 \quad (10)$$

```
> stuff:= [seq( [i,i/2], i=0..20, 2)];
```

$$stuff := [[0, 0], [2, 1], [4, 2], [6, 3], [8, 4], [10, 5], [12, 6], [14, 7], [16, 8], [18, 9], [20, 10]] \quad (11)$$

```
> stuff[3];
```

$$[4, 2] \quad (12)$$

```
> PolynomialInterpolation(stuff,x);
```

$$\frac{1}{2}x \quad (13)$$

```
> thing:=[[apple, pear], 3];
```

$$thing := [[apple, pear], 3] \quad (14)$$

```
> thing[1];
```

$$[apple, pear] \tag{15}$$

```
> op(thing[1]);
```

$$apple, pear \tag{16}$$

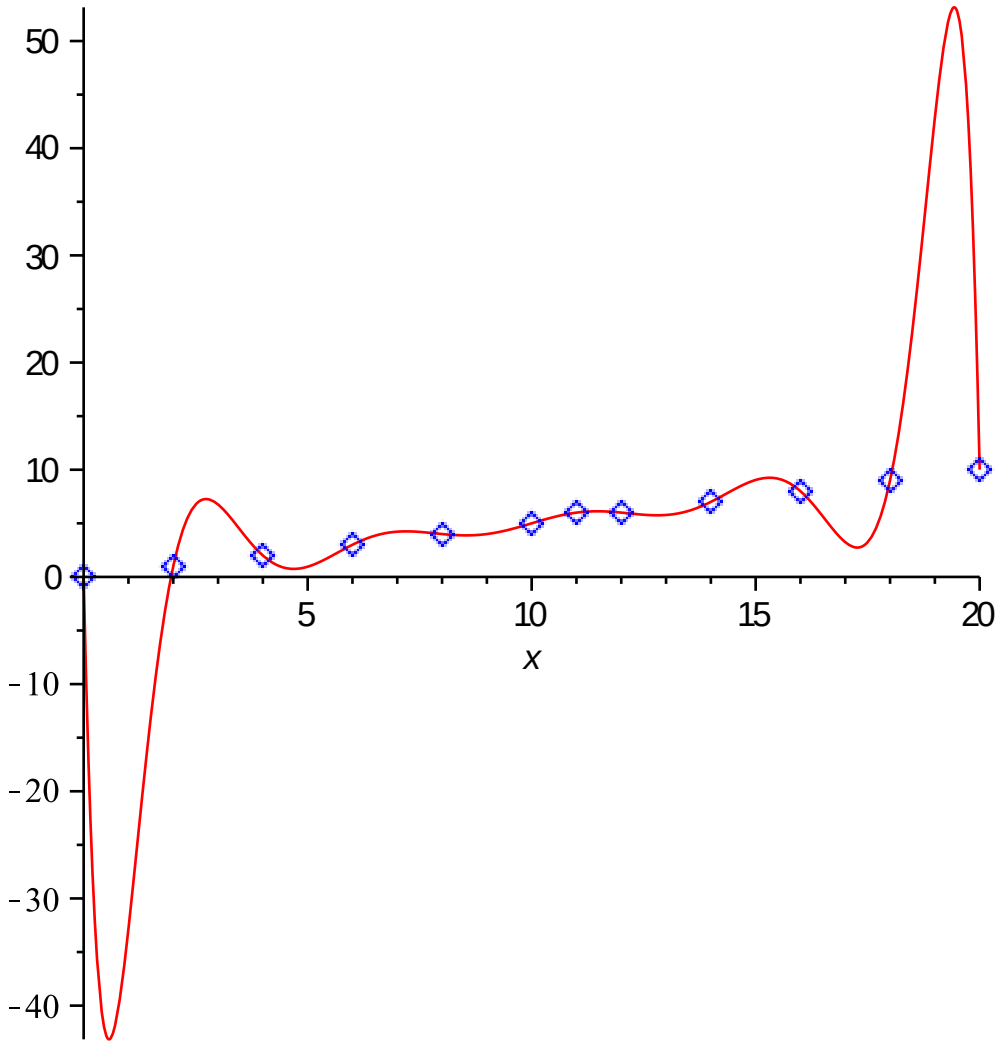
```
> nonsense:=[op(stuff),[11,6]];
```

$$nonsense := [[0, 0], [2, 1], [4, 2], [6, 3], [8, 4], [10, 5], [12, 6], [14, 7], [16, 8], [18, 9], [20, 10], [11, 6]] \tag{17}$$

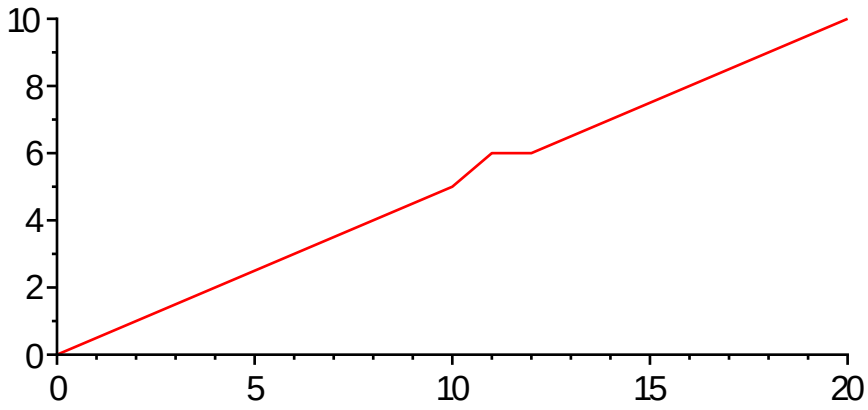
```
> polly:=PolynomialInterpolation(nonsense,x);
```

$$polly := -\frac{1}{19646550} x^{11} + \frac{1}{178605} x^{10} - \frac{16}{59535} x^9 + \frac{88}{11907} x^8 - \frac{5464}{42525} x^7 + \frac{12496}{8505} x^6 - \frac{1988032}{178605} x^5 + \frac{1957120}{35721} x^4 - \frac{16489472}{99225} x^3 + \frac{5496832}{19845} x^2 - \frac{261451}{1386} x \tag{18}$$

```
> display( {plot(polly,x=0..20),
            plot(nonsense,
              symbolsize=18,style=point,color=blue)});
```



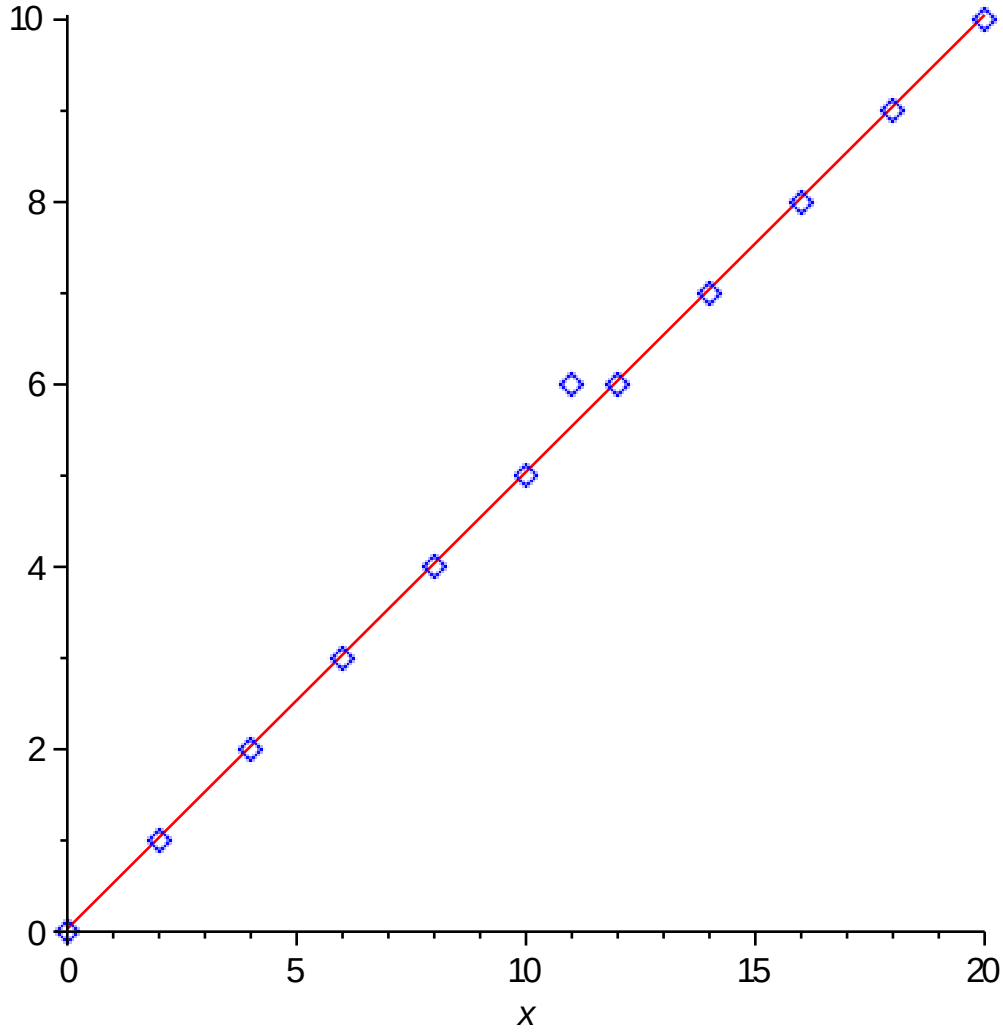

```
> plot( [seq(nonsense[i],i=1..6), nonsense[12], seq(nonsense[i],i=
  7..11)]);;
```




```
> cracker:=LeastSquares(nonsense,x);
```

$$cracker := \frac{15}{481} + \frac{241}{481}\, x \qquad (19)$$

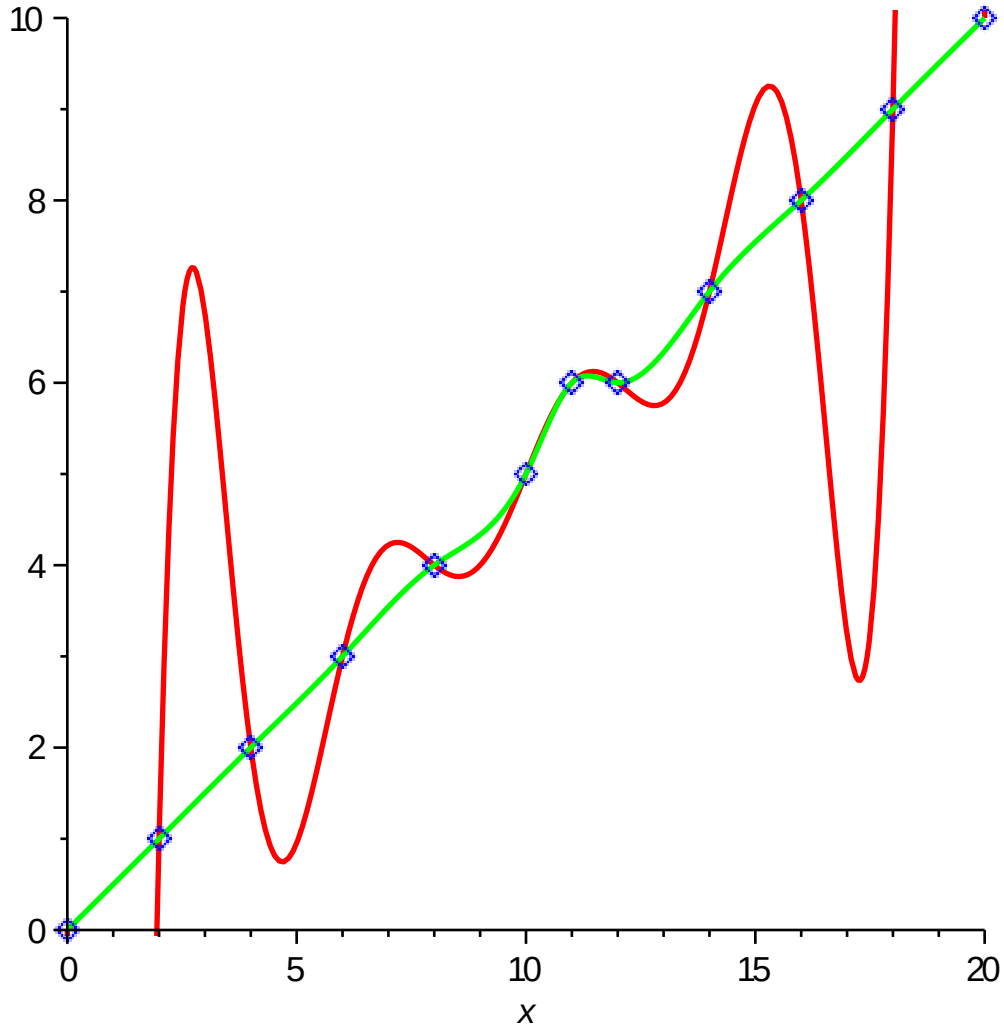
```
> display( {plot(cracker,x=0..20),
          plot(nonsense,
            symbolsize=18,style=point,color=blue)});
```




```
> parrot:=Spline(nonsense,x);
```

$$parrot := \begin{cases} \frac{633115}{1269902} x + \frac{459}{1269902} x^3 & x < 2 \\ \frac{11016}{634951} + \frac{600067}{1269902} x + \frac{8262}{634951} x^2 - \frac{2295}{1269902} x^3 & x < 4 \\ -\frac{341496}{634951} + \frac{1128835}{1269902} x - \frac{57834}{634951} x^2 + \frac{8721}{1269902} x^3 & x < 6 \\ \frac{4119984}{634951} - \frac{3332645}{1269902} x + \frac{313956}{634951} x^2 - \frac{32589}{1269902} x^3 & x < 8 \\ -\frac{35361360}{634951} + \frac{26278363}{1269902} x - \frac{1536732}{634951} x^2 + \frac{121635}{1269902} x^3 & x < 10 \\ \frac{328089640}{634951} - \frac{191792237}{1269902} x + \frac{9366798}{634951} x^2 - \frac{605267}{1269902} x^3 & x < 11 \\ -\frac{477516744}{634951} + \frac{247629427}{1269902} x - \frac{10606914}{634951} x^2 + \frac{605261}{1269902} x^3 & x < 12 \\ \frac{150511032}{634951} - \frac{66384461}{1269902} x + \frac{2476998}{634951} x^2 - \frac{121623}{1269902} x^3 & x < 14 \\ -\frac{61010208}{634951} + \frac{24267499}{1269902} x - \frac{760572}{634951} x^2 + \frac{32547}{1269902} x^3 & x < 16 \\ \frac{23187168}{634951} - \frac{7306517}{1269902} x + \frac{226116}{634951} x^2 - \frac{8565}{1269902} x^3 & x < 18 \\ -\frac{6783480}{634951} + \frac{2683699}{1269902} x - \frac{51390}{634951} x^2 + \frac{1713}{1269902} x^3 & otherwise \end{cases} \quad (20)$$

```
> display( {plot(polly,x=0..20), plot(parrot,x=0..20,color=green),
          plot(nonsense,
           symbolsize=18,style=point,color=blue)}, thickness=2,
  view=[0..20,0..10]);
```




```
> factor(x^4-2);
```

$$x^4 - 2 \tag{21}$$

```
> factor(x^4-3,{sqrt(2),sqrt(3)});
```

$$-\left(x^2+\sqrt{3}\right)\left(-x^2+\sqrt{3}\right) \tag{22}$$

```
> solve(x^4-2=0,x);
```

$$2^{1/4},\ I2^{1/4},\ -2^{1/4},\ -I2^{1/4} \tag{23}$$