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

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

```
> nops(stuff);
```

$$11 \quad (2)$$

```
> stuffy;
```

$$stuffy \quad (3)$$

```
> op(stuff);
```

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

```
> [op(stuff), EndThing];
```

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

how to do a subscript?

```
> thing[2];
```

$$thing_2 \quad (6)$$

or use underline key _ to get subscript and ^ to get superscript

```
> thing_2^(super)_(subsuper)
```

$$thing_2^{super}{}_{subsuper} \quad (7)$$

```
> stuff[6];
```

$$[10, 5] \quad (8)$$

```
> seq(stuff[i], i = 1 ..6);
```

$$[0, 0], [2, 1], [4, 2], [6, 3], [8, 4], [10, 5] \quad (9)$$

```
> [seq(stuff[i], i = 1 ..6), [11, 6], seq(stuff[i], i = 7 ..nops(stuff) ) ]
```

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

```
> stuff_3
```

$$[4, 2] \quad (11)$$

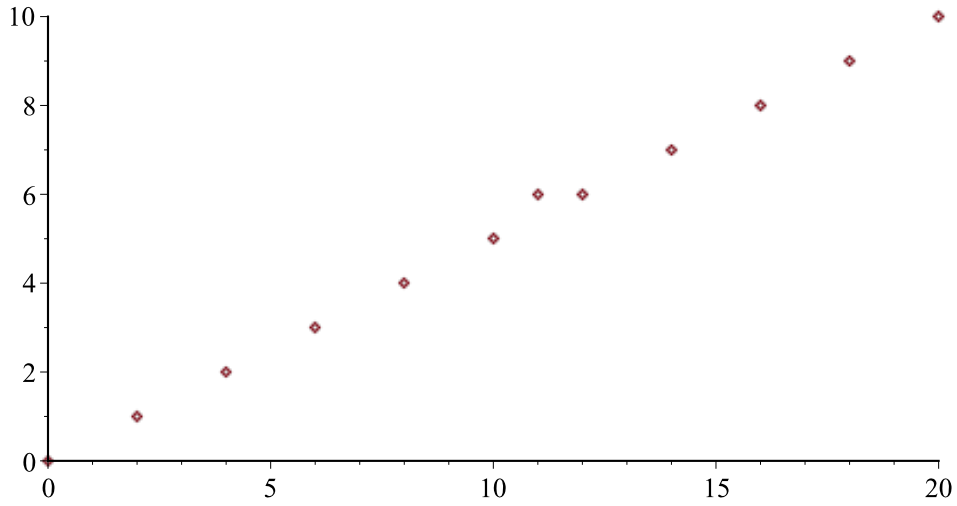
```
> stuff[3 ..7];
```

$$[[4, 2], [6, 3], [8, 4], [10, 5], [12, 6]] \quad (12)$$

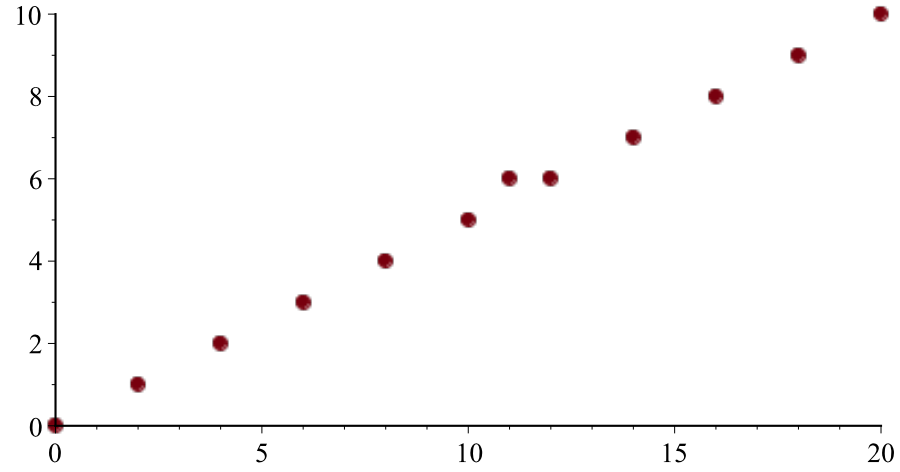
```
> stuffy := [op(stuff[1 ..6]), [11, 6], op(stuff[7 ..11]) ]
```

$$stuffy := [[0, 0], [2, 1], [4, 2], [6, 3], [8, 4], [10, 5], [11, 6], [12, 6], [14, 7], [16, 8], [18, 9], [20, 10]] \quad (13)$$

```
> plot(stuffy, style = point, scaling = constrained);
```




```
> with(plots) :
>
> setoptions(symbolsize = 15 , symbol = solidcircle, scaling = constrained);
> plot(stuffy, style = point);
```




```
>
> with(CurveFitting);
```

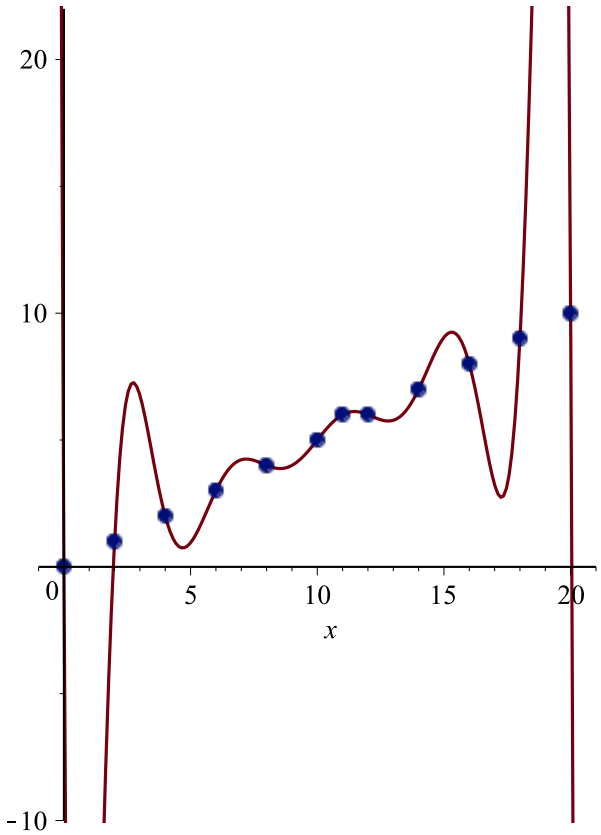
[*ArrayInterpolation*, *BSpline*, *BSplineCurve*, *Interactive*, *LeastSquares*, *PolynomialInterpolation*, *RationalInterpolation*, *Spline*, *ThieleInterpolation*] **(14)**

```
> g := PolynomialInterpolation(stuffy, x);
```

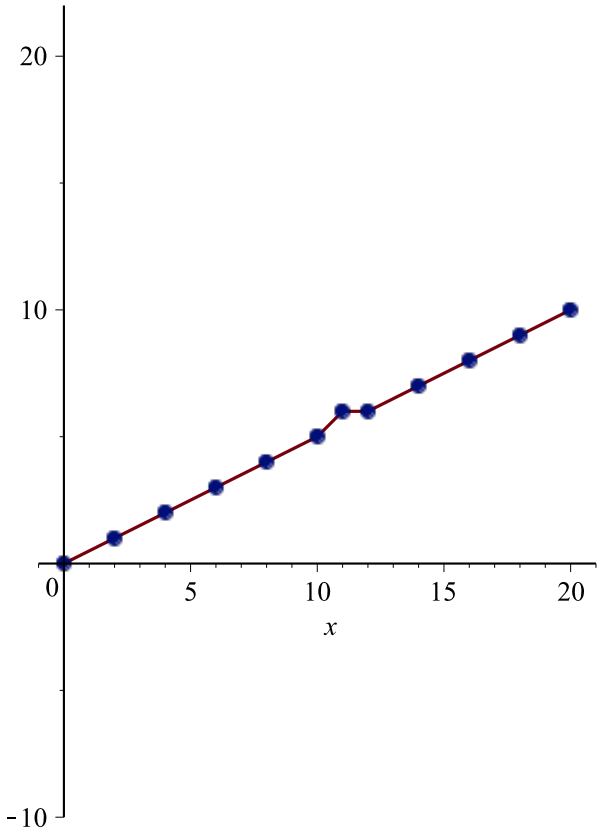
(15)

$$g := -\frac{1}{19646550}x^{11} + \frac{1}{178605}x^{10} - \frac{16}{59535}x^{9} + \frac{88}{11907}x^{8} - \frac{5464}{42525}x^{7} + \frac{12496}{8505}x^{6} - \frac{1988032}{178605}x^{5} + \frac{1957120}{35721}x^{4} - \frac{16489472}{99225}x^{3} + \frac{5496832}{19845}x^{2} - \frac{261451}{1386}x \quad \textbf{(15)}$$

```
> plot([g, stuffy], x=-1..21, view=[-1..21,-10..22], style=[line, point]);
```




```
> plot([stuffy, stuffy], x=-1..21, view=[-1..21,-10..22], style=[line, point]);
```

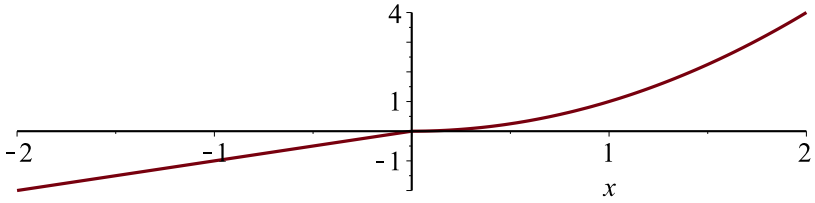



```
> piecewise( x < 0 , x, x^2);
```

$$\begin{cases} x & x < 0 \\ x^2 & otherwise \end{cases}$$

(16)

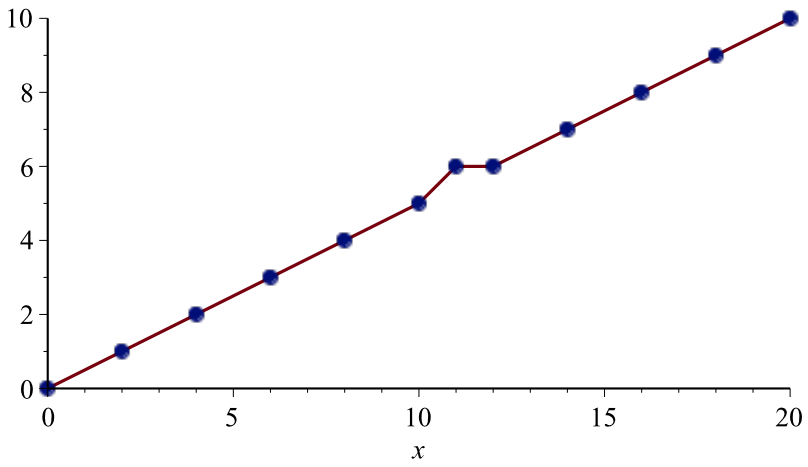
```
> plot(%, x =-2 ..2);
```



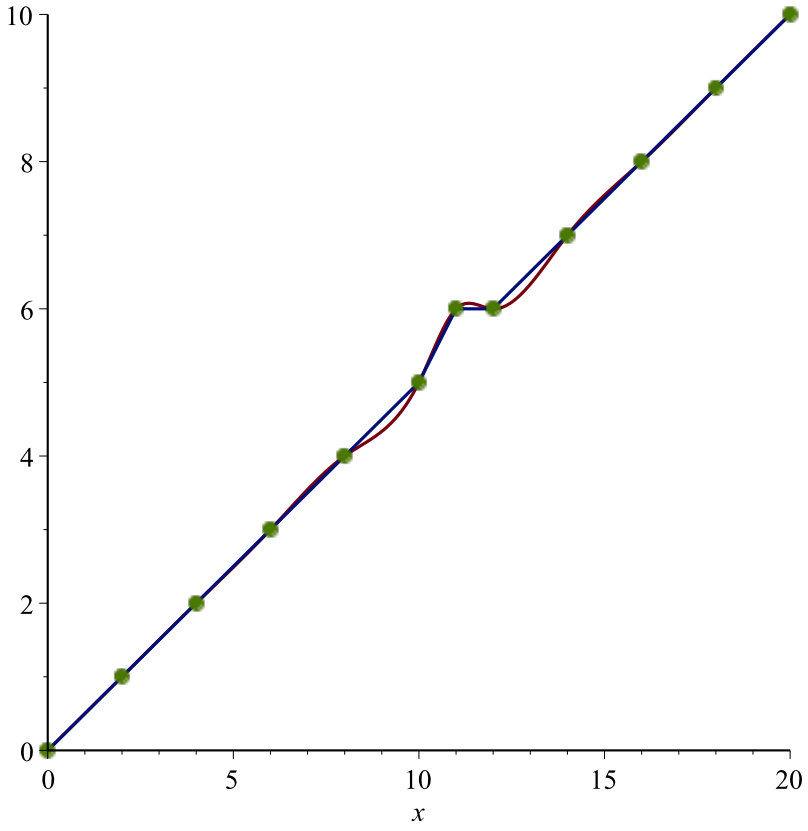

```
> ?Spline
> g1 := Spline(stuffy, x, degree = 1);
```

$$g1 := \begin{cases} \frac{1}{2} x & x < 2 \\ \frac{1}{2} x & x < 4 \\ \frac{1}{2} x & x < 6 \\ \frac{1}{2} x & x < 8 \\ \frac{1}{2} x & x < 10 \\ -5 + x & x < 11 \\ 6 & x < 12 \\ \frac{1}{2} x & x < 14 \\ \frac{1}{2} x & x < 16 \\ \frac{1}{2} x & x < 18 \\ \frac{1}{2} x & otherwise \end{cases} \quad (17)$$

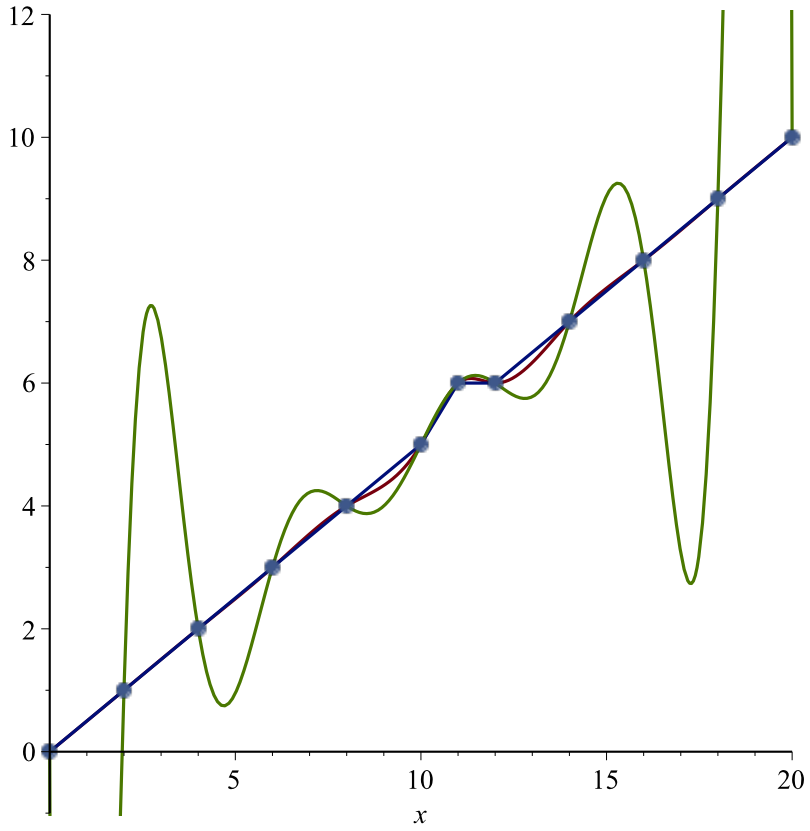
```
> plot([g1, stuffy], x = 0..20, style = [line, point]);
```




```
> plot([Spline(stuffy, x, degree = 3), g1, stuffy], x = 0..20, style = [line, line, point], scaling
      = unconstrained);
```




```
> plot( [Spline(stuffy, x, degree = 3), g1, g, stuffy], x = 0 ..20, style = [line, line, line, point], scaling
      = unconstrained, view = [0 ..20, -1 ..12 ]);
```



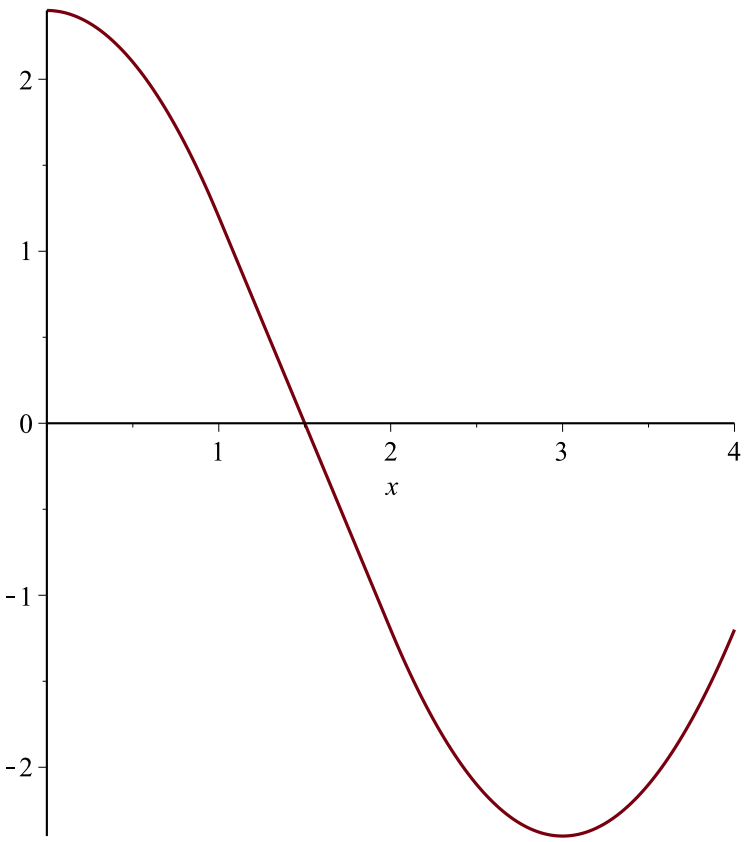

```
> splork := unapply(Spline( [[0, 0], [1, 2], [2, 2], [3, 0]], x, degree = 3), x);
```

$$splork := x \rightarrow piecewise\left(x < 1, \frac{12}{5}\,x - \frac{2}{5}\,x^3, x < 2, -\frac{2}{5} + \frac{18}{5}\,x - \frac{6}{5}\,x^2, -\frac{18}{5} + \frac{42}{5}\,x - \frac{18}{5}\,x^2 + \frac{2}{5}\,x^3\right) \quad \textbf{(18)}$$

```
> dsplork := D(splork);
```

$$dsplork := x \rightarrow piecewise\left(x \le 1, \frac{12}{5} - \frac{6}{5}\,x^2, x \le 2, \frac{18}{5} - \frac{12}{5}\,x, 2 < x, \frac{42}{5} - \frac{36}{5}\,x + \frac{6}{5}\,x^2\right) \quad \textbf{(19)}$$

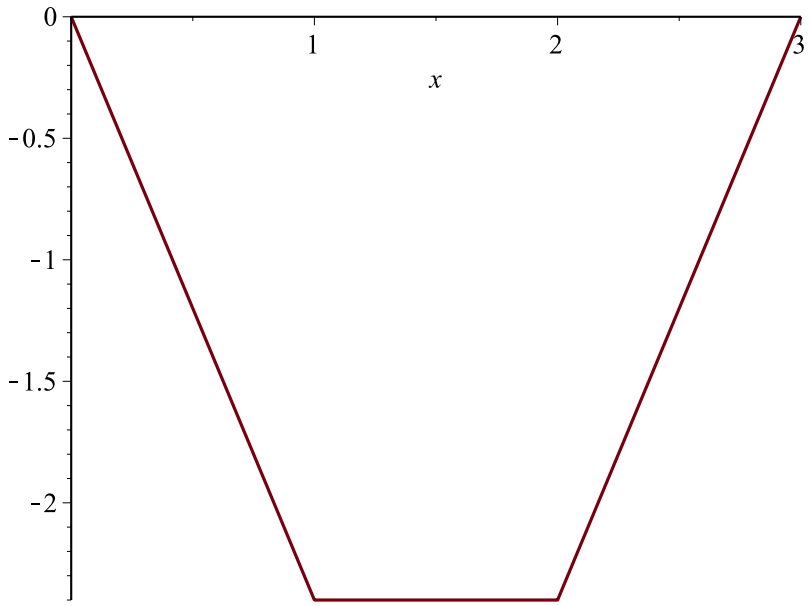
```
> plot(dsplork(x), x = 0..4);
```




```
> ddsplork := D(dsplork);
```

$$ddsplork := x \rightarrow piecewise\left(x \leq 1, -\frac{12}{5}\,x, x \leq 2, -\frac{12}{5}, 2 < x, -\frac{36}{5} + \frac{12}{5}\,x\right) \quad \textbf{(20)}$$

```
> plot(ddsplork(x), x = 0..3);
```




```
> Interactive(stuffy);
```

$$\begin{cases} \frac{633115}{1269902}\,x+\frac{459}{1269902}\,x^3 & x<2 \\ \frac{11016}{634951}+\frac{600067}{1269902}\,x+\frac{8262}{634951}\,x^2-\frac{2295}{1269902}\,x^3 & x<4 \\ -\frac{341496}{634951}+\frac{1128835}{1269902}\,x-\frac{57834}{634951}\,x^2+\frac{8721}{1269902}\,x^3 & x<6 \\ \frac{4119984}{634951}-\frac{3332645}{1269902}\,x+\frac{313956}{634951}\,x^2-\frac{32589}{1269902}\,x^3 & x<8 \\ -\frac{35361360}{634951}+\frac{26278363}{1269902}\,x-\frac{1536732}{634951}\,x^2+\frac{121635}{1269902}\,x^3 & x<10 \\ \frac{328089640}{634951}-\frac{191792237}{1269902}\,x+\frac{9366798}{634951}\,x^2-\frac{605267}{1269902}\,x^3 & x<11 \\ -\frac{477516744}{634951}+\frac{247629427}{1269902}\,x-\frac{10606914}{634951}\,x^2+\frac{605261}{1269902}\,x^3 & x<12 \\ \frac{150511032}{634951}-\frac{66384461}{1269902}\,x+\frac{2476998}{634951}\,x^2-\frac{121623}{1269902}\,x^3 & x<14 \\ -\frac{61010208}{634951}+\frac{24267499}{1269902}\,x-\frac{760572}{634951}\,x^2+\frac{32547}{1269902}\,x^3 & x<16 \\ \frac{23187168}{634951}-\frac{7306517}{1269902}\,x+\frac{226116}{634951}\,x^2-\frac{8565}{1269902}\,x^3 & x<18 \\ -\frac{6783480}{634951}+\frac{2683699}{1269902}\,x-\frac{51390}{634951}\,x^2+\frac{1713}{1269902}\,x^3 & \text{otherwise} \end{cases} \tag{21}$$

```
> ?Spline
```

```
> factor(x^2 + 5);
```

$$x^2+5 \tag{22}$$

```
> factor(x^2 + 5, [sqrt(5), I]);
```

$$-\left(x+\mathrm{I}\sqrt{5}\right)\left(-x+\mathrm{I}\sqrt{5}\right) \tag{23}$$

```
> factor(x^2 + 4, I);
```

$$-(x+2\,\mathrm{I})\,(-x+2\,\mathrm{I}) \tag{24}$$

```
>
```