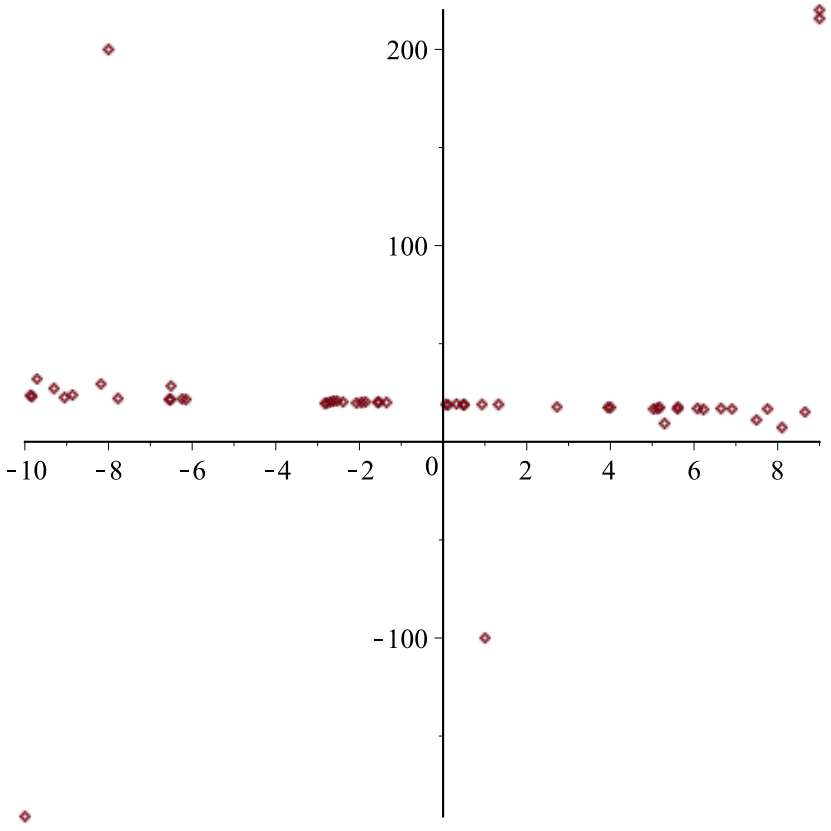
```
>
```

get data from
http://www.math.sunysb.edu/~scott/mat331.spr12/problems/bdata.txt

1) open page, cut and paste.

```
> bdata := [[8.65124763, 15.05801139], [.12218972, 18.71889232],
  [.7461504e-1, 19.08078948], [-1.559782888, 19.98371172],
  [-9.827561842, 23.06848486], [.32311207, 19.14564218],
  [-2.391913592, 20.30217888], [3.94617018, 17.43607480],
  [-2.830376788, 19.63133334], [-1.358328420, 20.05752868],
  [6.23095437, 16.43323636], [5.61148003, 17.81101690],
  [-2.625640890, 20.88674163], [-2.690509364, 20.36160632],
  [-8.857403420, 23.84930474], [-2.780958614, 19.81177275],
  [.49220217, 18.73849995], [-6.543130054, 21.51666222],
  [6.08427501, 16.97527217], [-6.242938578, 21.72698882],
  [-6.514007062, 21.45289388], [7.76133332, 16.75089278],
  [-9.054911088, 22.54190263], [5.03304675, 16.82722949],
  [-9.869721387, 23.70277711], [-7.770840930, 22.16242030],
  [-1.948518384, 20.06695018], [4.00205027, 17.47005315],
  [5.17321040, 17.55005418],
  [-2.076084772, 19.72089223], [-1.550062590, 20.21390427],
  [-6.143925098, 21.65680593], [5.60762551, 16.84921688],
  [6.64081052, 17.04952989],
  [2.71911796, 17.75913317], [.49583125, 18.89613761],
  [5.12446722, 16.91928245], [-1.852442276, 20.25908204],
  [6.90280682, 16.84990814], [-2.532240154, 20.72224765],
  [1.32201814, 18.91342503], [.93254506, 18.90640481],
  [-8.184966738, 29.44895089], [-9.307860036, 27.09063691],
  [-9.710001259, 32.12397498], [-6.499868778, 28.48508601],
  [7.492109388, 11.06831268], [5.295254201, 9.403916851],
  [8.105629482, 7.166928438], [9, 215.6599449],
  [-10, -191], [-8, 200], [9, 220], [1, -100]]:
> plot(bdata, style=point);
```



save data to a local file on mysbfiles.

```
> save(bdata, "X:mydata.txt");
> bdata := "cat";
```

$$bdata := \text{"cat"} \quad (1)$$

```
> bdata;
```

$$\text{"cat"} \quad (2)$$

```
> read("X:mydata.txt");
```

$$bdata := [[8.65124763, 15.05801139], [0.12218972, 18.71889232], [0.07461504, 19.08078948], [-1.559782888, 19.98371172], [-9.827561842, 23.06848486], [0.32311207, 19.14564218], [-2.391913592, 20.30217888], [3.94617018, 17.43607480], [-2.830376788, 19.63133334], [-1.358328420, 20.05752868], [6.23095437, 16.43323636], [5.61148003, 17.81101690], [-2.625640890, 20.88674163], [-2.690509364, 20.36160632], [-8.857403420, 23.84930474], [-2.780958614, 19.81177275], [0.49220217, 18.73849995], [-6.543130054, 21.51666222], [6.08427501, 16.97527217], [-6.242938578, 21.72698882], [-6.514007062, 21.45289388], [7.76133332, 16.75089278], [-9.054911088, 22.54190263], [5.03304675, 16.82722949], [-9.869721387, 23.70277711], [-7.770840930, 22.16242030], [-1.948518384, 20.06695018], [4.00205027, 17.47005315], [5.17321040, 17.55005418], [-2.076084772, \quad (3)$$

19.72089223], [-1.550062590, 20.21390427], [-6.143925098, 21.65680593],
[5.60762551, 16.84921688], [6.64081052, 17.04952989], [2.71911796, 17.75913317],
[0.49583125, 18.89613761], [5.12446722, 16.91928245], [-1.852442276, 20.25908204],
[6.90280682, 16.84990814], [-2.532240154, 20.72224765], [1.32201814, 18.91342503],
[0.93254506, 18.90640481], [-8.184966738, 29.44895089], [-9.307860036,
27.09063691], [-9.710001259, 32.12397498], [-6.499868778, 28.48508601],
[7.492109388, 11.06831268], [5.295254201, 9.403916851], [8.105629482,
7.166928438], [9, 215.6599449], [-10, -191], [-8, 200], [9, 220], [1, -100]]

> *bdata*;

[[8.65124763, 15.05801139], [0.12218972, 18.71889232], [0.07461504, 19.08078948], [
-1.559782888, 19.98371172], [-9.827561842, 23.06848486], [0.32311207,
19.14564218], [-2.391913592, 20.30217888], [3.94617018, 17.43607480], [
-2.830376788, 19.63133334], [-1.358328420, 20.05752868], [6.23095437,
16.43323636], [5.61148003, 17.81101690], [-2.625640890, 20.88674163], [
-2.690509364, 20.36160632], [-8.857403420, 23.84930474], [-2.780958614,
19.81177275], [0.49220217, 18.73849995], [-6.543130054, 21.51666222], [6.08427501,
16.97527217], [-6.242938578, 21.72698882], [-6.514007062, 21.45289388],
[7.76133332, 16.75089278], [-9.054911088, 22.54190263], [5.03304675, 16.82722949],
[-9.869721387, 23.70277711], [-7.770840930, 22.16242030], [-1.948518384,
20.06695018], [4.00205027, 17.47005315], [5.17321040, 17.55005418], [-2.076084772,
19.72089223], [-1.550062590, 20.21390427], [-6.143925098, 21.65680593],
[5.60762551, 16.84921688], [6.64081052, 17.04952989], [2.71911796, 17.75913317],
[0.49583125, 18.89613761], [5.12446722, 16.91928245], [-1.852442276, 20.25908204],
[6.90280682, 16.84990814], [-2.532240154, 20.72224765], [1.32201814, 18.91342503],
[0.93254506, 18.90640481], [-8.184966738, 29.44895089], [-9.307860036,
27.09063691], [-9.710001259, 32.12397498], [-6.499868778, 28.48508601],
[7.492109388, 11.06831268], [5.295254201, 9.403916851], [8.105629482,
7.166928438], [9, 215.6599449], [-10, -191], [-8, 200], [9, 220], [1, -100]] **(4)**

> *bdata* := "bleah";

bdata := "bleah" **(5)**

> *with*(*HTTP*);

[*Code*, *Form*, *Get*, *Post*, *URLDecode*, *URLEncode*, *URLParse*] **(6)**

> *Get*("http://www.math.sunysb.edu/~scott/mat331.spr12/problems/bdata.txt");

200, "bdata := [[8.65124763, 15.05801139], [.12218972, 18.71889232],
[.7461504e-1, 19.08078948], [-1.559782888, 19.98371172],
[-9.827561842, 23.06848486], [.32311207, 19.14564218],
[-2.391913592, 20.30217888], [3.94617018, 17.43607480],
[-2.830376788, 19.63133334], [-1.358328420, 20.05752868],
[6.23095437, 16.43323636], [5.61148003, 17.81101690],
[-2.625640890, 20.88674163], [-2.690509364, 20.36160632],
[-8.857403420, 23.84930474], [-2.780958614, 19.81177275],
[.49220217, 18.73849995], [-6.543130054, 21.51666222],
[6.08427501, 16.97527217], [-6.242938578, 21.72698882], **(7)**

[-6.514007062, 21.45289388], [7.76133332, 16.75089278],
[-9.054911088, 22.54190263], [5.03304675, 16.82722949],
[-9.869721387, 23.70277711], [-7.770840930, 22.16242030],
[-1.948518384,20.06695018], [4.00205027, 17.47005315],
[5.17321040, 17.55005418],
[-2.076084772, 19.72089223], [-1.550062590, 20.21390427],
[-6.143925098, 21.65680593], [5.60762551, 16.84921688],
[6.64081052, 17.04952989],
[2.71911796, 17.75913317], [.49583125, 18.89613761],
[5.12446722, 16.91928245], [-1.852442276, 20.25908204],
[6.90280682, 16.84990814], [-2.532240154, 20.72224765],
[1.32201814, 18.91342503], [.93254506, 18.90640481],
[-8.184966738, 29.44895089], [-9.307860036, 27.09063691],
[-9.710001259, 32.12397498], [-6.499868778, 28.48508601],
[7.492109388, 11.06831268], [5.295254201, 9.403916851],
[8.105629482, 7.166928438], [9, 215.6599449],
[-10, -191], [-8, 200], [9, 220], [1, -100]];
", *table*(["Content-Type" = "text/plain; charset=ISO-8859-1", "Accept-Ranges" = "bytes",
"Date" = "Mon, 18 Feb 2013 19:51:16 GMT", "Last-Modified"
= "Mon, 05 Mar 2012 20:20:03 GMT", "Server" = "Apache/2.0.58 (Unix)",
"Content-Length" = "1470", "Etag" = ""19553cd-5be-a6c1a2c0""])

> *code*, *stuff*, *hdrs*
:= *Get*("http://www.math.sunysb.edu/~scott/mat331.spr12/problems/bdata.txt") :

> *stuff*;

"bdata := [[8.65124763, 15.05801139], [.12218972, 18.71889232], **(8)**
[.7461504e-1, 19.08078948], [-1.559782888, 19.98371172],
[-9.827561842, 23.06848486], [.32311207, 19.14564218],
[-2.391913592, 20.30217888], [3.94617018, 17.43607480],
[-2.830376788, 19.63133334], [-1.358328420, 20.05752868],
[6.23095437, 16.43323636], [5.61148003, 17.81101690],
[-2.625640890, 20.88674163], [-2.690509364, 20.36160632],
[-8.857403420, 23.84930474], [-2.780958614, 19.81177275],
[.49220217, 18.73849995], [-6.543130054, 21.51666222],
[6.08427501, 16.97527217], [-6.242938578, 21.72698882],
[-6.514007062, 21.45289388], [7.76133332, 16.75089278],
[-9.054911088, 22.54190263], [5.03304675, 16.82722949],
[-9.869721387, 23.70277711], [-7.770840930, 22.16242030],
[-1.948518384,20.06695018], [4.00205027, 17.47005315],
[5.17321040, 17.55005418],
[-2.076084772, 19.72089223], [-1.550062590, 20.21390427],
[-6.143925098, 21.65680593], [5.60762551, 16.84921688],

```
[6.64081052, 17.04952989],
[2.71911796, 17.75913317], [.49583125, 18.89613761],
[5.12446722, 16.91928245], [-1.852442276, 20.25908204],
[6.90280682, 16.84990814], [-2.532240154, 20.72224765],
[1.32201814, 18.91342503], [.93254506, 18.90640481],
[-8.184966738, 29.44895089], [-9.307860036, 27.09063691],
[-9.710001259, 32.12397498], [-6.499868778, 28.48508601],
[7.492109388, 11.06831268], [5.295254201, 9.403916851],
[8.105629482, 7.166928438], [9, 215.6599449],
[-10, -191], [-8, 200], [9, 220], [1, -100]];
"
```

```
> bdata;
```

"bleah" **(9)**

```
> eval( parse( stuff ) );
```

```
[[8.65124763, 15.05801139], [0.12218972, 18.71889232], [0.07461504, 19.08078948], [
    -1.559782888, 19.98371172], [-9.827561842, 23.06848486], [0.32311207,
    19.14564218], [-2.391913592, 20.30217888], [3.94617018, 17.43607480], [
    -2.830376788, 19.63133334], [-1.358328420, 20.05752868], [6.23095437,
    16.43323636], [5.61148003, 17.81101690], [-2.625640890, 20.88674163], [
    -2.690509364, 20.36160632], [-8.857403420, 23.84930474], [-2.780958614,
    19.81177275], [0.49220217, 18.73849995], [-6.543130054, 21.51666222], [6.08427501,
    16.97527217], [-6.242938578, 21.72698882], [-6.514007062, 21.45289388],
    [7.76133332, 16.75089278], [-9.054911088, 22.54190263], [5.03304675, 16.82722949],
    [-9.869721387, 23.70277711], [-7.770840930, 22.16242030], [-1.948518384,
    20.06695018], [4.00205027, 17.47005315], [5.17321040, 17.55005418], [-2.076084772,
    19.72089223], [-1.550062590, 20.21390427], [-6.143925098, 21.65680593],
    [5.60762551, 16.84921688], [6.64081052, 17.04952989], [2.71911796, 17.75913317],
    [0.49583125, 18.89613761], [5.12446722, 16.91928245], [-1.852442276, 20.25908204],
    [6.90280682, 16.84990814], [-2.532240154, 20.72224765], [1.32201814, 18.91342503],
    [0.93254506, 18.90640481], [-8.184966738, 29.44895089], [-9.307860036,
    27.09063691], [-9.710001259, 32.12397498], [-6.499868778, 28.48508601],
    [7.492109388, 11.06831268], [5.295254201, 9.403916851], [8.105629482,
    7.166928438], [9, 215.6599449], [-10, -191], [-8, 200], [9, 220], [1, -100]]
```

(10)

```
> bdata;
```

```
[[8.65124763, 15.05801139], [0.12218972, 18.71889232], [0.07461504, 19.08078948], [
    -1.559782888, 19.98371172], [-9.827561842, 23.06848486], [0.32311207,
    19.14564218], [-2.391913592, 20.30217888], [3.94617018, 17.43607480], [
    -2.830376788, 19.63133334], [-1.358328420, 20.05752868], [6.23095437,
    16.43323636], [5.61148003, 17.81101690], [-2.625640890, 20.88674163], [
    -2.690509364, 20.36160632], [-8.857403420, 23.84930474], [-2.780958614,
    19.81177275], [0.49220217, 18.73849995], [-6.543130054, 21.51666222], [6.08427501,
    16.97527217], [-6.242938578, 21.72698882], [-6.514007062, 21.45289388],
    [7.76133332, 16.75089278], [-9.054911088, 22.54190263], [5.03304675, 16.82722949],
```

(11)

[−9.869721387, 23.70277711], [−7.770840930, 22.16242030], [−1.948518384, 20.06695018], [4.00205027, 17.47005315], [5.17321040, 17.55005418], [−2.076084772, 19.72089223], [−1.550062590, 20.21390427], [−6.143925098, 21.65680593], [5.60762551, 16.84921688], [6.64081052, 17.04952989], [2.71911796, 17.75913317], [0.49583125, 18.89613761], [5.12446722, 16.91928245], [−1.852442276, 20.25908204], [6.90280682, 16.84990814], [−2.532240154, 20.72224765], [1.32201814, 18.91342503], [0.93254506, 18.90640481], [−8.184966738, 29.44895089], [−9.307860036, 27.09063691], [−9.710001259, 32.12397498], [−6.499868778, 28.48508601], [7.492109388, 11.06831268], [5.295254201, 9.403916851], [8.105629482, 7.166928438], [9, 215.6599449], [−10, −191], [−8, 200], [9, 220], [1, −100]]

```
> with(HTTP);
```

[Code, Form, Get, Post, URLDecode, URLEncode, URLParse] **(12)**

```
> code, guts, hdr := Get("http://www.math.sunysb.edu/~scott/mat331.spr12/problems/bdata.txt") :
> eval(parse(guts)) :
> guts[1..30];
```

"bdata := [[8.65124763, 15.0580" **(13)**

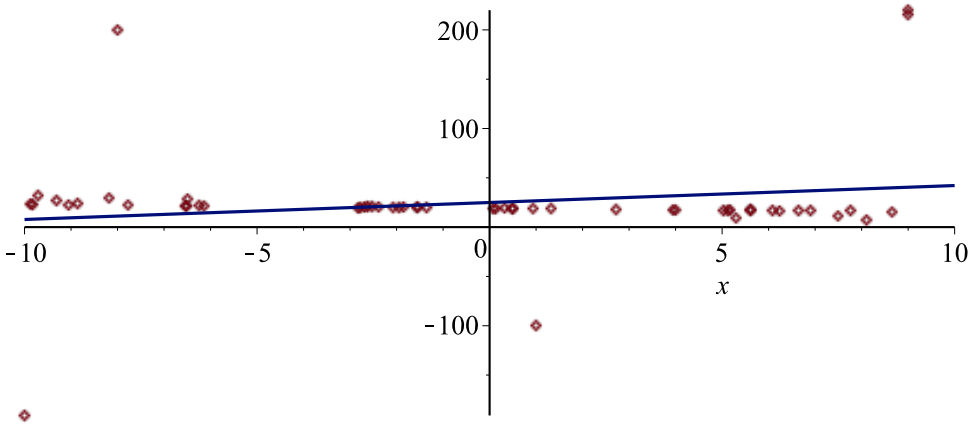
```
> with(CurveFitting);
```

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

```
> bline := LeastSquares(bdata, x);
```

$$bline := 24.9502982841361 + 1.72140920411782\,x \quad \textbf{(15)}$$

```
> plot([bdata, bline], x=-10..10, style=[point, line]);
```




```
> nops(bdata);
```

54 **(16)**

Way to fix it number 1: Throw away bad data.

if |y|>50, throw it out.

```
>
> seq(i^2, i=1..10);
```

1, 4, 9, 16, 25, 36, 49, 64, 81, 100 **(17)**

```
> for i from 1 to 10 do
    i^2;
  od;
```

1
4
9
16
25
36
49
64
81
100 **(18)**

```
> for i from 1 to nops(bdata) do
    if (abs(bdata[i][2]) > 50) then
      print(i, bdata[i]);
    fi;
Error, unterminated loop
for i from 1 to nops(bdata) do if (abs(bdata[i][2]) > 50) then print(i, bdata[i]);  fi;
```

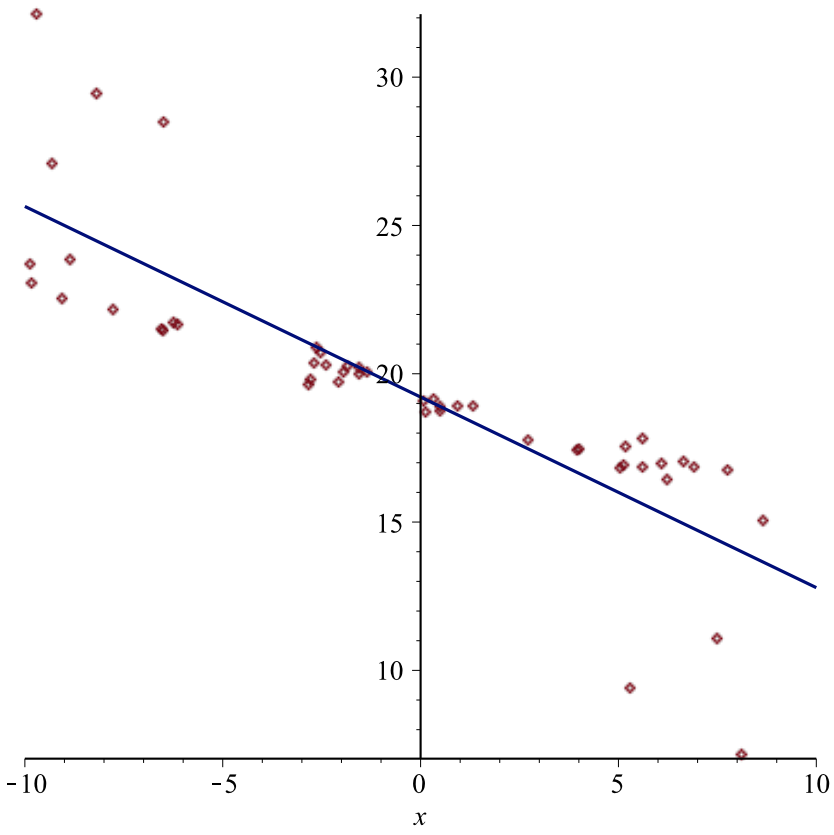
```
> for i from 1 to nops(bdata) do
    if (abs(bdata[i][2]) > 50) then
      print(i, bdata[i]);
    fi;
   end do;
```

50, [9, 215.6599449]
51, [-10, -191]
52, [-8, 200]
53, [9, 220]
54, [1, -100] **(19)**

```
> gdata:=[];
  for i from 1 to nops(bdata) do
    if (abs(bdata[i][2])<50) then
      gdata:=[ op(gdata), bdata[i] ];
    fi;
  od:
```

gdata := [ ] **(20)**

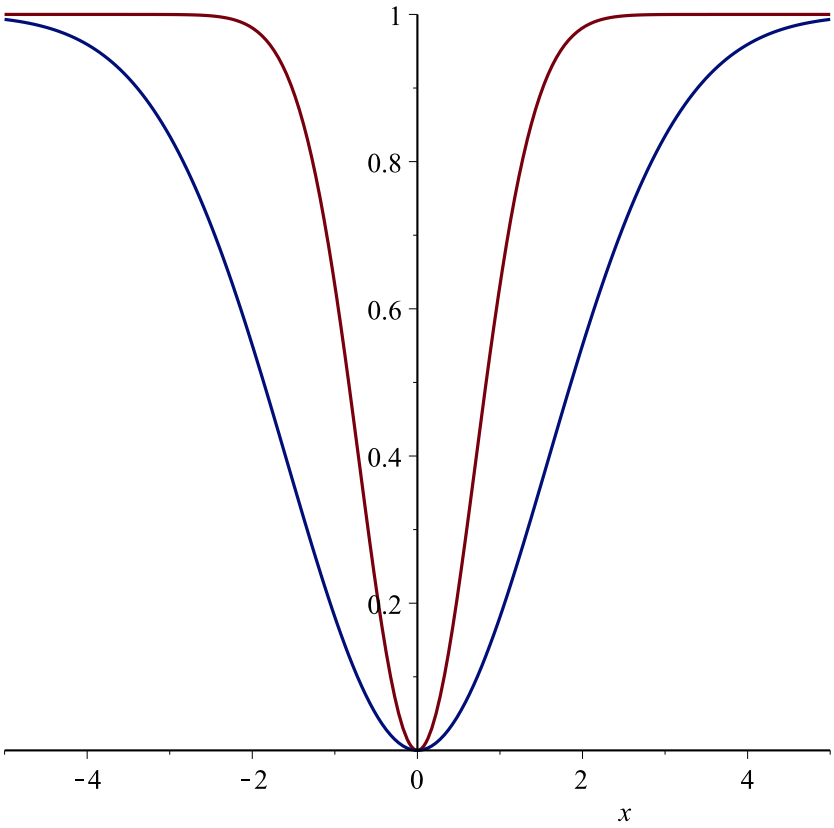
```
> plot( [gdata, LeastSquares(gdata, x) ], x =-10 ..10, style = [point, line]);
```



> $series(1 - \exp(-x^2), x, 8);$

$$x^2 - \frac{1}{2}x^4 + \frac{1}{6}x^6 + O(x^8) \qquad (21)$$

> $plot\left(\left[1 - \exp(-x^2), 1 - \exp\left(-\frac{x^2}{5}\right)\right], x = -5..5\right);$


1
0.8
0.6
0.4
0.2
-4
-2
0
2
4
x