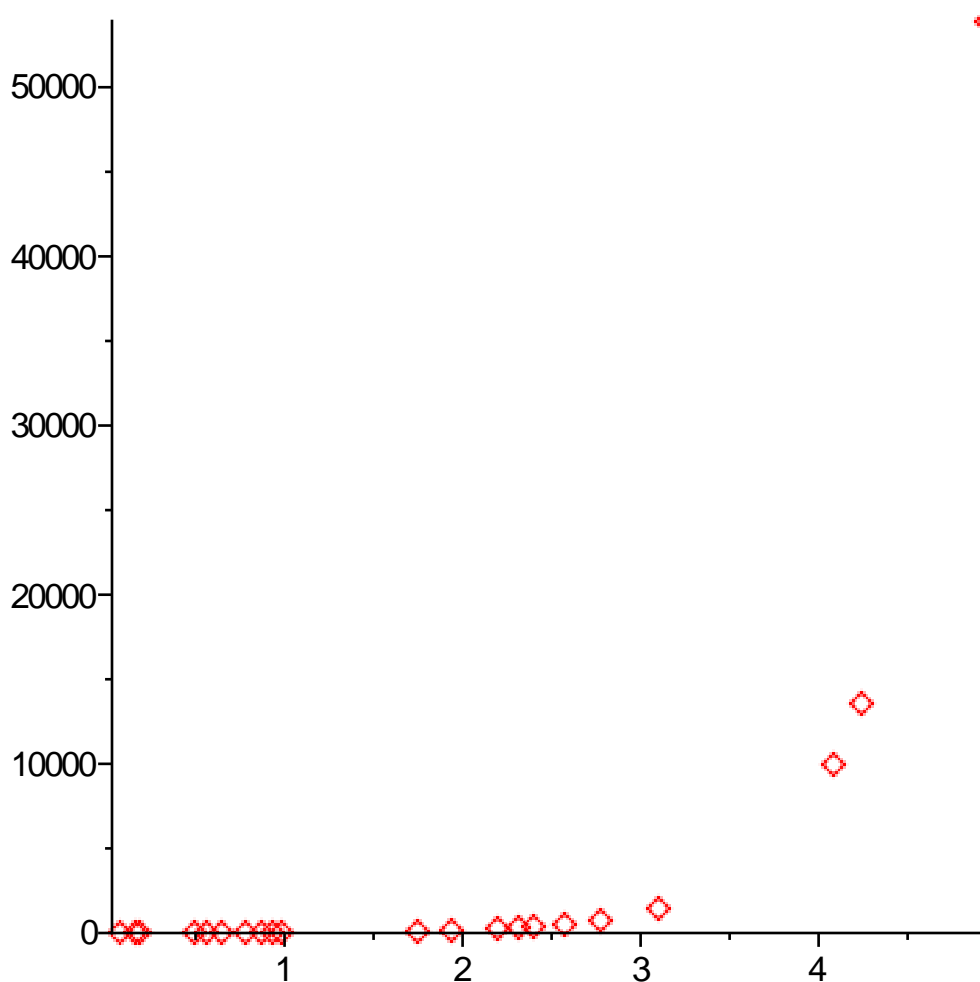


```
> prob10 := [[4.239769836, 13559.75137], [0.5598281410, 9.732681394], [0.9833881570, 22.79237389], [3.101811228, 1456.580538], [0.7780114740, 15.94091435], [1.935268542, 147.1519294], [0.6478579130, 12.54482861], [1.747738912, 101.7758552], [4.083798094, 9986.189916], [2.311897757, 309.0945326], [0.7558042735e-1, 3.775360665], [0.4919153978, 9.239410976], [2.774459250, 765.6868895], [0.1870277144, 5.016250738], [0.8688155065, 17.90012576], [2.569767624, 512.2432485], [2.398130487, 366.5614576], [0.1635927303, 4.322895932], [2.197614913, 246.8497673], [0.9350282485, 20.79712409], [4.943594472, 53914.11084]];
```

```
prob10 := [[4.239769836, 13559.75137], [0.5598281410, 9.732681394], [0.9833881570, 22.79237389], [3.101811228, 1456.580538], [0.7780114740, 15.94091435], [1.935268542, 147.1519294], [0.6478579130, 12.54482861], [1.747738912, 101.7758552], [4.083798094, 9986.189916], [2.311897757, 309.0945326], [0.07558042735, 3.775360665], [0.4919153978, 9.239410976], [2.774459250, 765.6868895], [0.1870277144, 5.016250738], [0.8688155065, 17.90012576], [2.569767624, 512.2432485], [2.398130487, 366.5614576], [0.1635927303, 4.322895932], [2.197614913, 246.8497673], [0.9350282485, 20.79712409], [4.943594472, 53914.11084]]
```

(1)

```
> plot(prob10, style=point, symbolsize=18);
```



```
> with(CurveFitting):
LeastSquares(prob10,x,curve=a*exp(b*x));
Error. (in CurveFitting:-LeastSquares) curve to fit is not
linear in the parameters
```

Let's take log of the y values..

```
> pt:=[2,5.1];
```

```
pt := [2, 5.1]
```

(2)

```
> [2,ln(5.1)];
```

```
[2, 1.629240540]
```

(3)

```
> ldat:=
[seq([ prob10[i][1], ln(prob10[i][2]),i=1..nops(prob10))];
```

```
ldat := [[4.239769836, 9.514861226], [0.5598281410, 2.275489438], [0.9833881570,
3.126426002], [3.101811228, 7.283846870], [0.7780114740, 2.768889034],
[1.935268542, 4.991465586], [0.6478579130, 2.529308518], [1.747738912,
4.622772897], [4.083798094, 9.208958409], [2.311897757, 5.733647161],
[0.07558042735, 1.328495919], [0.4919153978, 2.223478136], [2.774459250,
6.640773326], [0.1870277144, 1.612682790], [0.8688155065, 2.884807739],
[2.569767624, 6.238799607], [2.398130487, 5.904166195], [0.1635927303,
1.463925532], [2.197614913, 5.508779922], [0.9350282485, 3.034814712],
```

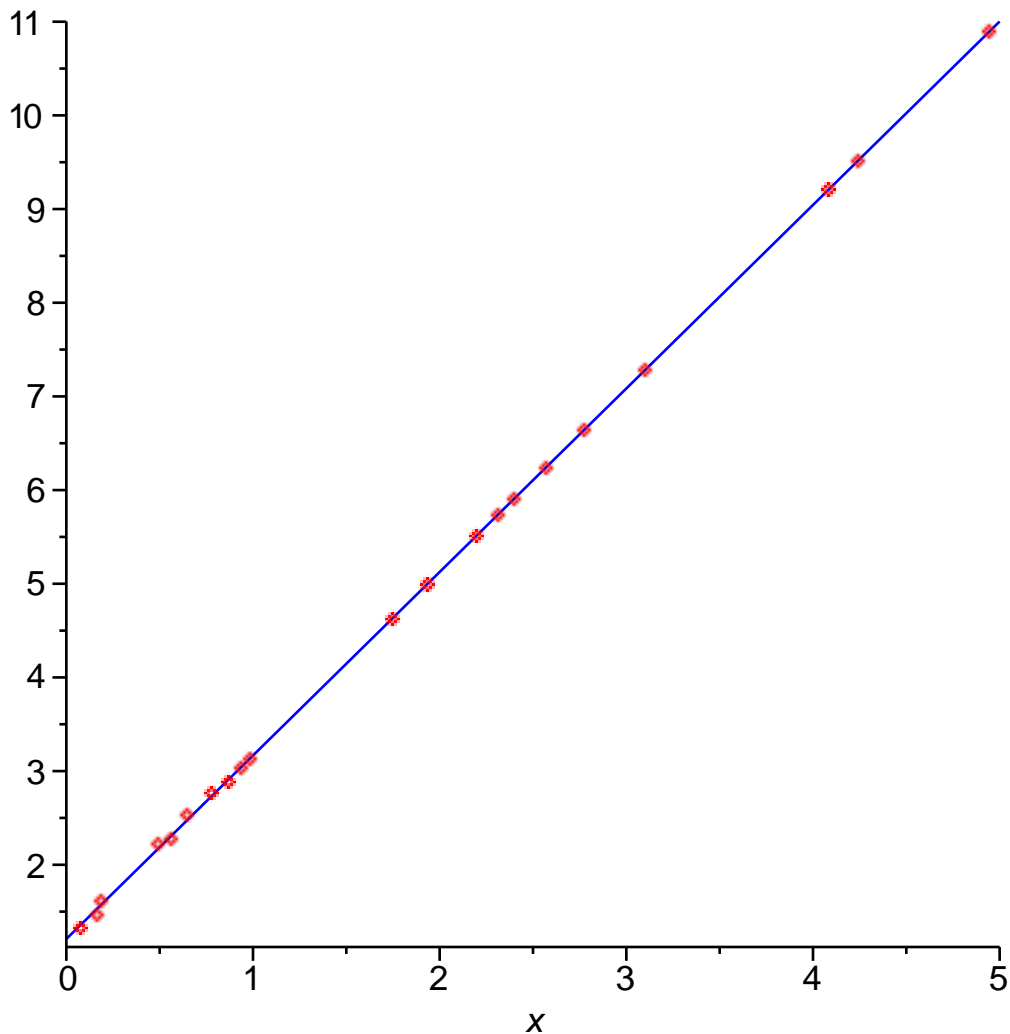
(4)

```
[4.943594472, 10.89514752]]
```

```
> line:=LeastSquares(ladat,x);  
line := 1.20765411823636 + 1.95896834248951 x
```

(5)

```
> display({ plot( ldat, style=point),  
plot(line, x=0..5, color=blue)});
```



```
> a:=exp(1.20765411823636); b:=1.9589683424895;  
a := 3.345626993  
b := 1.9589683424895
```

(6)

```
> a*exp(b*x);  
3.345626993 e1.9589683424895 x
```

(7)

```
> line;  
1.20765411823636 + 1.95896834248951 x
```

(8)

```
> b:=coeff(line,x);  
b := 1.95896834248951
```

Error, invalid input: coeff received 1, which is not valid for its 2nd argument, x

```
> a:=eval(line,x=0);  
a := 1.20765411823636
```

(9)

```
> b:=eval(line-a, x=1);
```

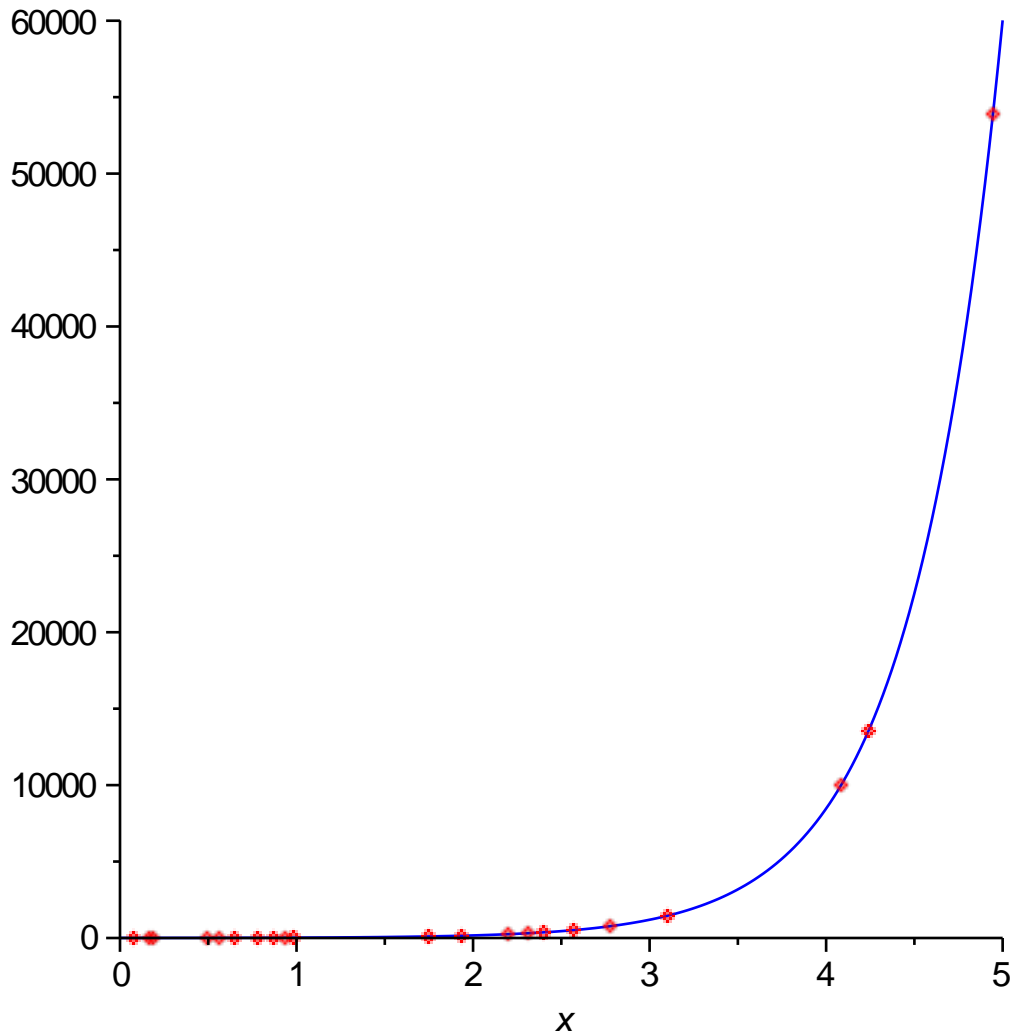
(10)

```
b := 1.95896834248951 (10)
```

```
> b:=eval(diff(line,x),x=1);  
b := 1.95896834248951 (11)
```

```
> ecurve:= exp(a)*exp(b*x);  
ecurve := 3.34562699423015 e1.95896834248951x (12)
```

```
> display ( { plot(prob10, style=point) ,  
plot(ecurve, x=0..5, color=blue)});
```



```
> with(HTTP):  
> URL:="http://www.math.sunysb.edu/~scott/mat331.  
spr12/problems/lsg_data.txt";  
> status,webfile,headers:=Get(URL): Code(status);
```

```
URL := "http://www.math.sunysb.edu/~scott/mat331.spr12/problems/lsg_data.txt"  
"OK" (13)
```

```
> n:=0:  
> while (n < length(webfile)) do  
> parse(webfile,statement,lastread='n', offset=n);  
> od:  
defined set_seed(s), line_pts(), bad_line_pts(), quadratic_pts
```

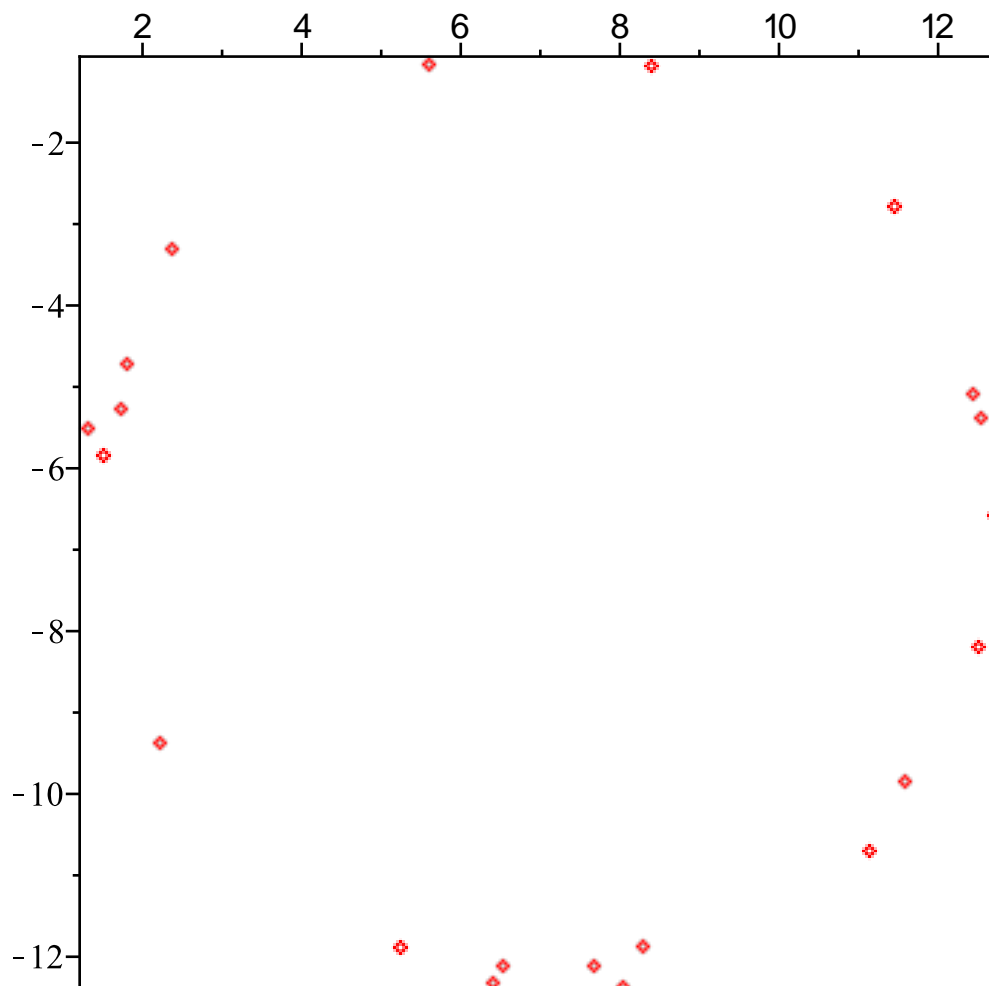
```
( ), exp_pts(), cubic_pts(), and circle_pts()
```

```
> cdata:=circle_pts();
```

```
cdata := [[6.402935578, -12.31823738], [5.597294955, -1.040791181], [8.398829375,  
-1.057773382], [2.215594457, -9.374138856], [8.291996465, -11.87559348],  
[7.677826194, -12.11476537], [2.371950203, -3.308231827], [1.803545787,  
-4.719846061], [1.729877239, -5.270440633], [1.509924515, -5.841293394],  
[8.035256910, -12.37132600], [12.44019501, -5.085412232], [1.310419387,  
-5.512238002], [5.241277604, -11.88730767], [11.45257561, -2.784442484],  
[12.53992205, -5.378478806], [12.70634427, -6.581852115], [11.13690842,  
-10.69896705], [12.50827059, -8.194759473], [6.530632350, -12.11571696],  
[11.58681823, -9.849056627]]
```

(14)

```
> plot(cdata,style=point);
```



```
> epsilon:=(a,b,r, pt)->( (a-pt[1])^2 + (b-pt[2])^2 - r^2)^2;
```

$$\varepsilon := (a, b, r, pt) \rightarrow ((a - pt_1)^2 + (b - pt_2)^2 - r^2)^2$$

(15)

```
> epsilon( 0,0, 3, [3,0]);
```

0

(16)

```
> epsilon( 0,0, 3, [3.1,0]);
```

0.3721

(17)

```
> epsilon( 0,0, 3, [2.9,0]);
0.3481 (18)
```

```
> epsilon( 0,0, 3, [22.9,0]);
2.656474681 105 (19)
```

```
> sum( epsilon(A, B,r, cdata[i]), i=1..nops(cdata));
```

```
((A - 6.402935578)2 + (B + 12.31823738)2 - r2)2 + ((A - 5.597294955)2 + (B + 1.040791181)2 - r2)2 + ((A - 8.398829375)2 + (B + 1.057773382)2 - r2)2 + ((A - 2.215594457)2 + (B + 9.374138856)2 - r2)2 + ((A - 8.291996465)2 + (B + 11.87559348)2 - r2)2 + ((A - 7.677826194)2 + (B + 12.11476537)2 - r2)2 + ((A - 2.371950203)2 + (B + 3.308231827)2 - r2)2 + ((A - 1.803545787)2 + (B + 4.719846061)2 - r2)2 + ((A - 1.729877239)2 + (B + 5.270440633)2 - r2)2 + ((A - 1.509924515)2 + (B + 5.841293394)2 - r2)2 + ((A - 8.035256910)2 + (B + 12.37132600)2 - r2)2 + ((A - 12.44019501)2 + (B + 5.085412232)2 - r2)2 + ((A - 1.310419387)2 + (B + 5.512238002)2 - r2)2 + ((A - 5.241277604)2 + (B + 11.88730767)2 - r2)2 + ((A - 11.45257561)2 + (B + 2.784442484)2 - r2)2 + ((A - 12.53992205)2 + (B + 5.378478806)2 - r2)2 + ((A - 12.70634427)2 + (B + 6.581852115)2 - r2)2 + ((A - 11.13690842)2 + (B + 10.69896705)2 - r2)2 + ((A - 12.50827059)2 + (B + 8.194759473)2 - r2)2 + ((A - 6.530632350)2 + (B + 12.11571696)2 - r2)2 + ((A - 11.58681823)2 + (B + 9.849056627)2 - r2)2
```

```
> f:=unapply(convert(6*taylor(arctan(x), x=0, 19),polynom), x);
f:=x→6x - 2x3 +  $\frac{6}{5}x^5 - \frac{6}{7}x^7 + \frac{2}{3}x^9 - \frac{6}{11}x^{11} + \frac{6}{13}x^{13} - \frac{2}{5}x^{15} + \frac{6}{17}x^{17}$  (21)
```

```
> f(1/sqrt(3.0))
Warning, inserted missing semicolon at end of statement
3.141599773 (22)
```