

```
> # here is some stuff...
```

Stuff you don't want to see

[these are words and this one is **bold and** this is *italic* and this is maple command

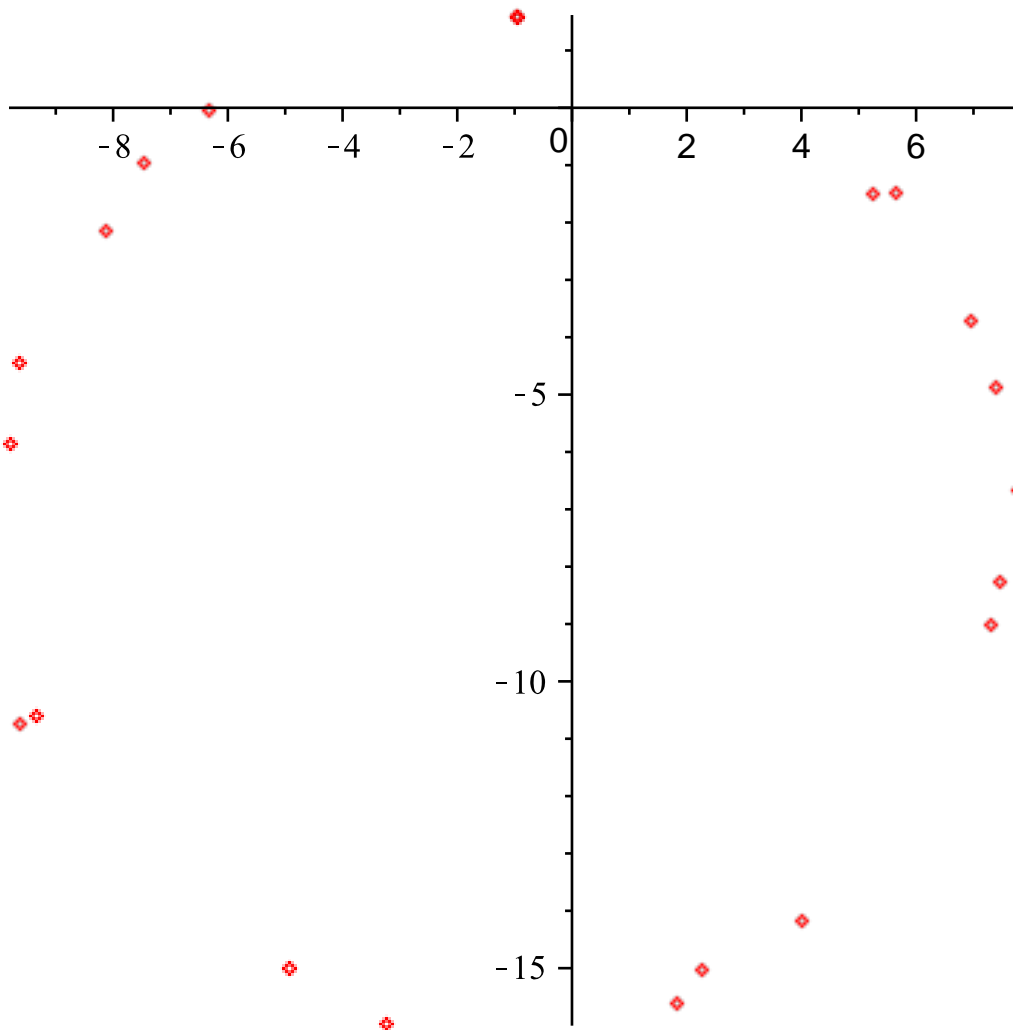
```
ifactor(12345); this is some math  $\frac{x^2}{\cos(3x)}$ 
```

```
> ReadFromWeb:=proc(URL::string, {printfile::truefalse:=false})
> local n,m, status, webfile, headers;
> status,webfile,headers:=HTTP[Get](URL);
> if ( HTTP[Code](status) <> "OK") then
>   error(HTTP[Code](status),URL);
> fi;
> # now read the web page
> n:=0;
> while (n < length(webfile)) do
>   m:=n;
>   parse(webfile,statement,lastread='n', offset=n);
>   if (printfile) then printf("%s",webfile[m+1..n]); fi;
> od;
> end;
```

```
> prefix:="http://www.math.sunysb.edu/~scott/mat331.
spr12/problems/";
```

```
> ReadFromWeb( cat(prefix,"prob10.txt"),printfile);
prob10 := [[4.239769836, 13559.75137], [.5598281410,
9.732681394], [.983388157\
0, 22.79237389], [3.101811228, 1456.580538], [.7780114740,
15.94091435], [1.93\
5268542, 147.1519294], [.6478579130, 12.54482861], [1.747738912,
101.7758552],
[4.083798094, 9986.189916], [2.311897757, 309.0945326],
[.7558042735e-1, 3.775\
360665], [.4919153978, 9.239410976], [2.774459250, 765.6868895],
[.1870277144,
5.016250738], [.8688155065, 17.90012576], [2.569767624,
512.2432485], [2.39813\
0487, 366.5614576], [.1635927303, 4.322895932], [2.197614913,
246.8497673], [.\
9350282485, 20.79712409], [4.943594472, 53914.11084]];
```

```
> ReadFromWeb( cat(prefix,"lsq_data.txt"));
defined set_seed(s), line_pts(), bad_line_pts(), quadratic_pts
(), exp_pts(), cubic_pts(), and circle_pts()
> cpts:=circle_pts():
plot(cpts,style=point);
```



```
> epsilon := (a,b,r, pt) -> ((pt[1]-a)^2 + (pt[2]-b)^2 - r^2)^2;
      ε := (a, b, r, pt) → ((pt1 - a)2 + (pt2 - b)2 - r2)2 (1)
```

```
> epsilon(0,0,3, [3,0]);
      0 (2)
```

```
> epsilon(0,0,3, [3,0.3]);
      0.0081 (3)
```

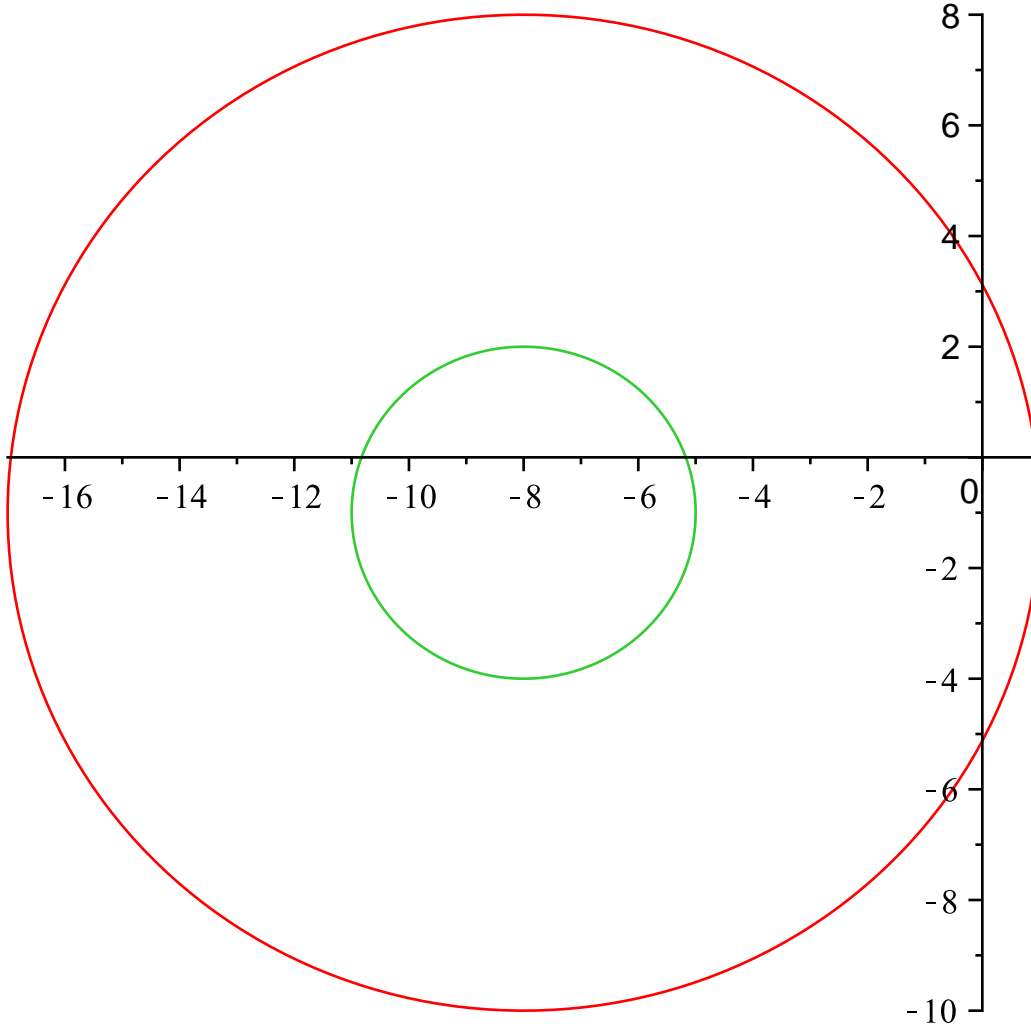
```
> H := (a, b, r, data) ->
      sum( epsilon(a,b,r, data[i]), i=1..nops(data)) / nops(data);
      H := (a, b, r, data) → 
$$\frac{\sum_{i=1}^{nops(data)} \epsilon(a, b, r, data_i)}{nops(data)}$$
 (4)
```

```
> H( -8, -1, 9, cpts);
      20597.21900 (5)
```

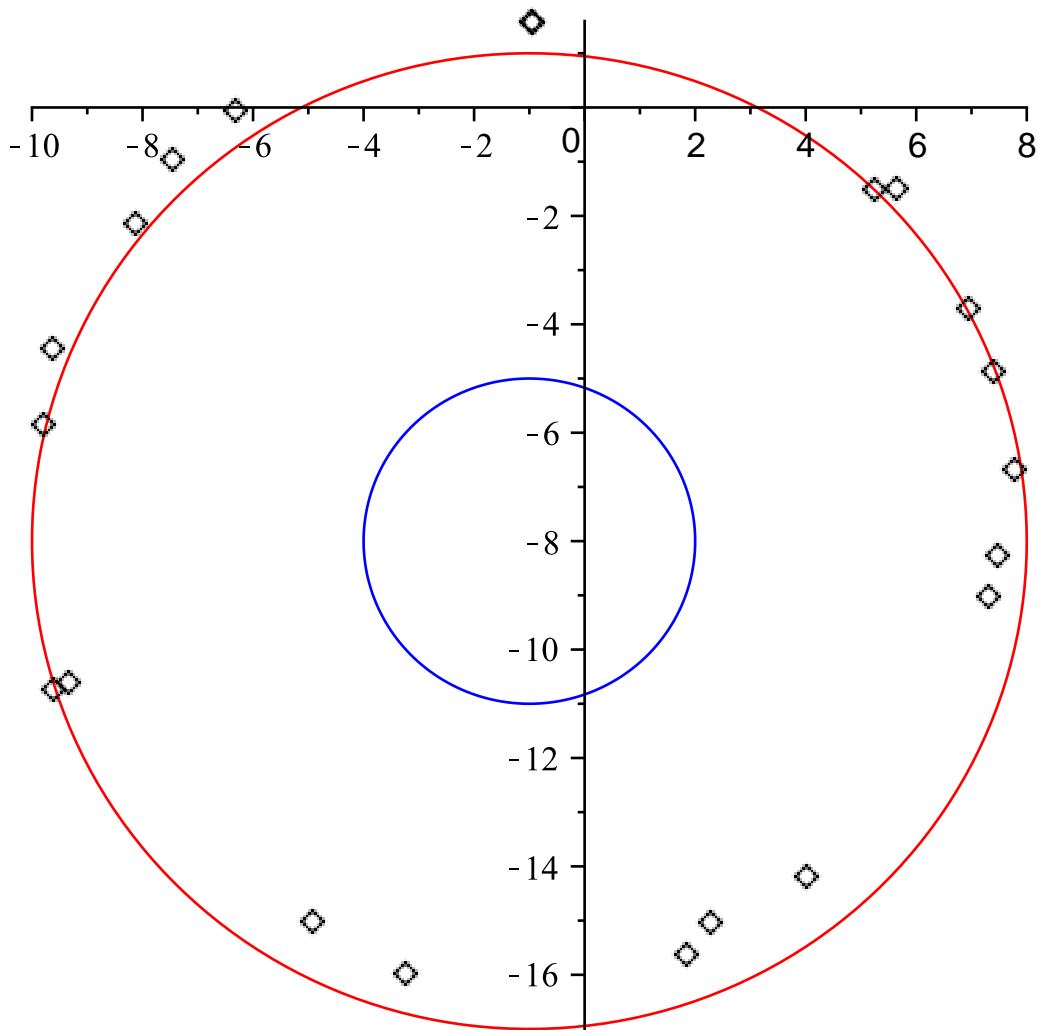
```
> H( -8, -1, 3, cpts);
      37783.69421 (6)
```

```
> circ := (a,b,r) -> [r*cos(t)+a, r*sin(t)+b, t=0..2*Pi];
      circ := (a, b, r) → [r cos(t) + a, r sin(t) + b, t=0..2 π] (7)
```

```
> plot( [circ(-8, -1, 9), circ(-8,-1,3)] );
```



```
> plot( [circ(-1, -8, 9), circ(-1,-8,3), cpts],  
  style=[line,line,point], symbolsize=18,  
  color=[red,blue,black] );
```



```
> H(-1,-8,9,cpts);
103.4191084 (8)
```

```
> H(-1,-8,3,cpts);
4949.783738 (9)
```

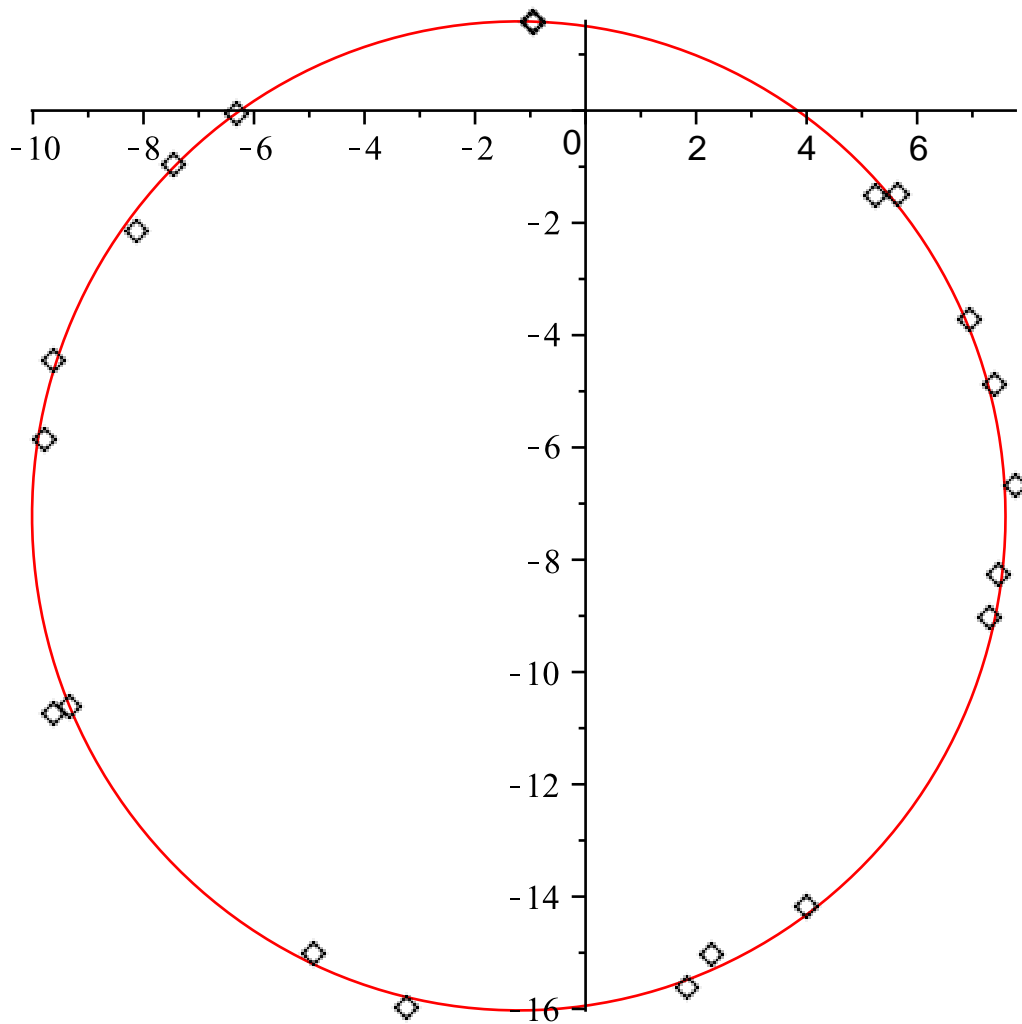
```
> expand(H(a,b,r,cpts));
691.1430006 a - 247.9552764 r^2 + 22559.87916 + 5307.960848 b + 423.8337419 a^2
+ 27.67594199 a b + 2.752209475 a b^2 - 2.752209476 a r^2 + 27.23655591 a^2 b + 2 a^2 b^2
- 2 a^2 r^2 - 27.23655591 b r^2 - 2 b^2 r^2 + 567.9873645 b^2 + 2.752209475 a^3 + a^4
+ 27.23655591 b^3 + b^4 + r^4 (10)
```

```
> map(expand,
[diff(H(a,b,r,cpts),a)=0, diff(H(a,b,r,cpts),b)=0, diff(H(a,b,r,
cpts),r)=0]);
[847.6674835 a - 2.752209475 r^2 + 27.67594199 b + 8.256628431 a^2 + 54.47311183 a b
+ 4 a b^2 - 4 a r^2 + 2.752209475 b^2 + 4 a^3 + 691.1430005 = 0, 27.67594199 a
- 27.23655590 r^2 + 5307.960848 + 1135.974729 b + 27.23655590 a^2 + 5.504418953 a b
+ 4 a^2 b - 4 b r^2 + 81.70966773 b^2 + 4 b^3 = 0, -495.9105533 r + 4 r^3 - 5.504418953 r a
- 4 r a^2 - 54.47311180 r b - 4 r b^2 = 0] (11)
```

```

> crits:=solve([diff(H(a,b,r,cpts),a)=0, diff(H(a,b,r,cpts),b)=0,
diff(H(a,b,r,cpts),r)=0]);
crits := {a = -0.4098920488 + 12.84407505 I, b = -5.317888390 - 1.336667248 I, r = 0.}, {a      (12)
= -2.634835217 + 1.730676211 I, b = -6.421916734 + 12.04586730 I, r = 0.}, {a =
-0.9606693781, b = -6.995911281, r = 0.}, {a = -2.634835217 - 1.730676211 I, b =
-6.421916734 - 12.04586730 I, r = 0.}, {a = -0.4098920488 - 12.84407505 I, b =
-5.317888390 + 1.336667248 I, r = 0.}, {a = -1.209049202, b = -7.219382706, r
= 8.807927465}, {a = -1.209049202, b = -7.219382706, r = -8.807927465}
> crits[1];
{a = -0.4098920488 + 12.84407505 I, b = -5.317888390 - 1.336667248 I, r = 0.}      (13)
> crits[2];
{a = -2.634835217 + 1.730676211 I, b = -6.421916734 + 12.04586730 I, r = 0.}      (14)
> crits[3];
{a = -0.9606693781, b = -6.995911281, r = 0.}      (15)
> crits[4];
{a = -2.634835217 - 1.730676211 I, b = -6.421916734 - 12.04586730 I, r = 0.}      (16)
> crits[5];
{a = -0.4098920488 - 12.84407505 I, b = -5.317888390 + 1.336667248 I, r = 0.}      (17)
> crits[6];
{a = -1.209049202, b = -7.219382706, r = 8.807927465}      (18)
> crits[7];
{a = -1.209049202, b = -7.219382706, r = -8.807927465}      (19)
> plot([circ(-1.209049202,-7.219382706, 8.807927465), cpts],
style=[line,point], symbolsize=18,
color=[red,black]);

```



```
> crits;
```

```
{a = -0.4098920488 + 12.84407505 I, b = -5.317888390 - 1.336667248 I, r = 0.}, {a =  
-2.634835217 + 1.730676211 I, b = -6.421916734 + 12.04586730 I, r = 0.}, {a =  
-0.9606693781, b = -6.995911281, r = 0.}, {a = -2.634835217 - 1.730676211 I, b =  
-6.421916734 - 12.04586730 I, r = 0.}, {a = -0.4098920488 - 12.84407505 I, b =  
-5.317888390 + 1.336667248 I, r = 0.}, {a = -1.209049202, b = -7.219382706, r  
= 8.807927465}, {a = -1.209049202, b = -7.219382706, r = -8.807927465}
```

(20)

```
> mycrit:=[seq(subs(crits[i],[a,b,r]),i=1..nops([crits]))];
```

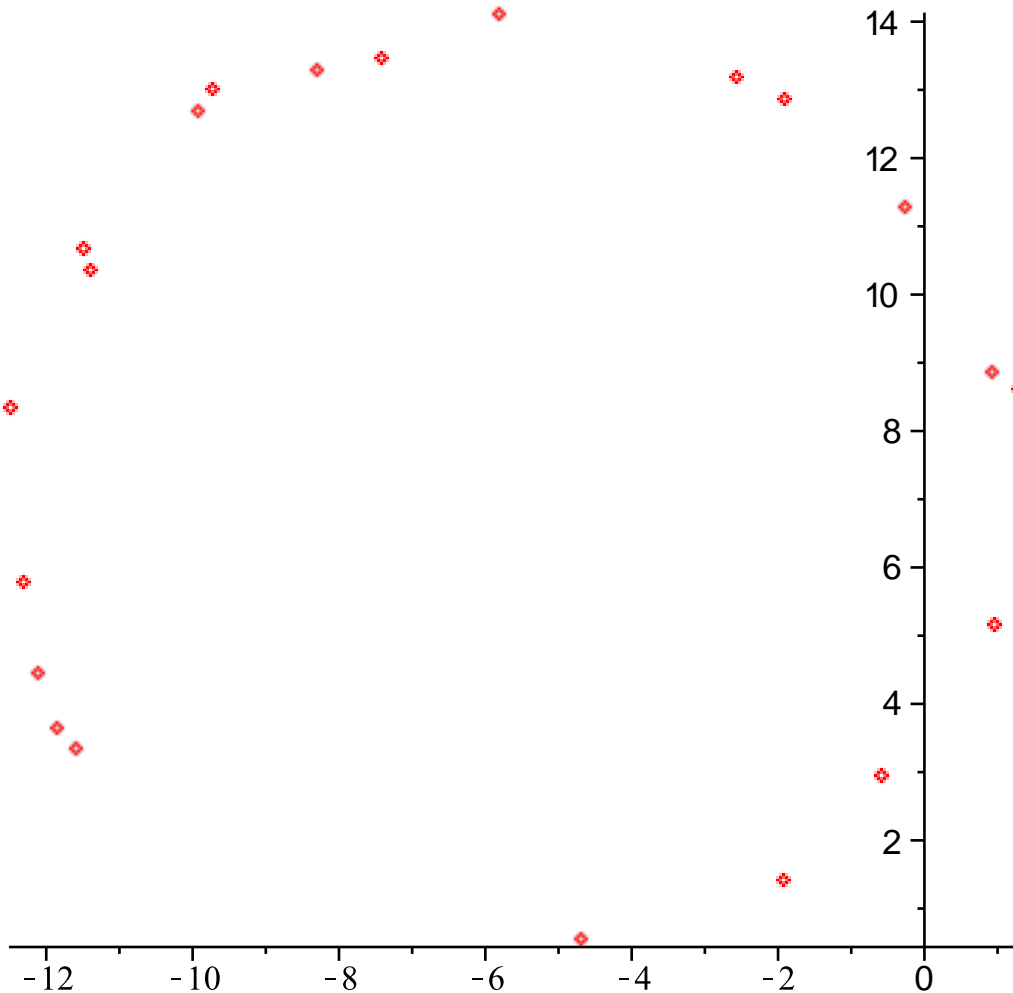
```
mycrit:= [[-0.4098920488 + 12.84407505 I, -5.317888390 - 1.336667248 I, 0.], [  
-2.634835217 + 1.730676211 I, -6.421916734 + 12.04586730 I, 0.], [-0.9606693781,  
-6.995911281, 0.], [-2.634835217 - 1.730676211 I, -6.421916734 - 12.04586730 I,  
0.], [-0.4098920488 - 12.84407505 I, -5.317888390 + 1.336667248 I, 0.], [  
-1.209049202, -7.219382706, 8.807927465], [-1.209049202, -7.219382706,  
-8.807927465]]
```

(21)

Error, `)` unexpected

Get data, do it again.

```
> henry:=circle_pts():
plot(henry,style=point);
```



```
> epsilon:= (a,b,r, pt)-> ((pt[1]-a)^2 + (pt[2]-b)^2 - r^2)^2;
H:= (a, b, r, data) ->
sum( epsilon(a,b,r, data[i]), i=1..nops(data)) / nops(data);
```

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

$$H := (a, b, r, data) \rightarrow \frac{\sum_{i=1}^{nops(data)} \varepsilon(a, b, r, data_i)}{nops(data)}$$

(22)

```
> crits:=solve( [diff(H(a,b,r,henry),a)=0, diff(H(a,b,r,henry),b)=
0, diff(H(a,b,r,henry),r)=0] );
```

```
crits := {a = -5.869379564 + 10.23744636 I, b = 11.99458287 - 1.916616593 I, r = 0.}, {a =
-3.675992194 + 0.2692990486 I, b = 8.828690480 - 9.517103704 I, r = 0.}, {a =
-5.996353675, b = 7.859372664, r = 0.}, {a = -3.675992194 - 0.2692990486 I, b
= 8.828690480 + 9.517103704 I, r = 0.}, {a = -5.869379564 - 10.23744636 I, b
= 11.99458287 + 1.916616593 I, r = 0.}, {a = -5.703056306, b = 7.135665900, r
```

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```
=6.854534963}, {a = -5.703056306, b = 7.135665900, r = -6.854534963}
```

```
> bleah:=subs(crits[6],[a,b,r]);
```

```
bleah := [-5.703056306, 7.135665900, 6.854534963]
```

(24)

```
> plot( [circ(op(bleah)), henry], style=[line,point], symbolsize=18,  
color=[red,black], legend=["the circle", points], scaling=constrained );
```

