```
> restart:
  with(linalg):
  p:=(x)-> x^3-3*x+1;
```
Warning, new definition for norm
Warning, new definition for trace

$$p := x \rightarrow x^3 - 3\,x + 1$$

```
> x0:=1.:x1:=2.:x2:=-1.:
```

```
> p0:=p(x0);p1:=p(x1);p2:=p(x2);
```

$$p0 := -1.$$

$$p1 := 3.$$

$$p2 := 3.$$

```
> x02:=x0^2:x12:=x1^2:x22:=x2^2:
```

```
> A := matrix(
  [[x02,x0,1],[x12,x1,1],[x22,x2,
  1]] ):
  b := vector( [p0,p1,p2]):
  s:=linsolve(A, b);
```

$$s :=$$

$$[2.000000000, -2.000000000, -1.000000000]$$

```
> 
```

```
> k:=s[1]:l:=s[2]:m:=s[3]:
```

```
> sols:=
```

```
[solve(k*x^2+l*x+m=0,x)];
```

$$sols := [-.3660254038, 1.366025404]$$

```
> q1:=sols[1];q2:=sols[2];
```

$$q1 := -.3660254038$$

$$q2 := 1.366025404$$

```
> x0:=x0;x1:=x1;x2:=x2;q1:=q1;q2:
  =q2;
```

$$x0 := 1.$$

$$x1 := 2.$$

$$x2 := -1.$$

$$q1 := -.3660254038$$

$$q2 := 1.366025404$$

```
> sort([x0,x1,x2,q1,q2]);
```

$$[-1., -.3660254038, 1., 1.366025404, 2.]$$

```
> p(1.366025404);
```

$$-.549038105$$

```
> #-------------- Next Iteration
  ------------------
```

```
> x0:=x0:x1:=x1:x2:=q2:
```

```
> p0:=p(x0);p1:=p(x1);p2:=p(x2);
```

$$p0 := -1.$$

$$p1 := 3.$$

$$p2 := -.549038105$$

```
> x02:=x0^2:x12:=x1^2:x22:=x2^2:
```

```
> A := matrix(
  [[x02,x0,1],[x12,x1,1],[x22,x2,
  1]] ):
  b := vector( [p0,p1,p2]):
  s:=linsolve(A, b);
```

$$s :=$$
$$[4.366025403, -9.098076204, 3.732050801]$$

```
>
```

```
> k:=s[1]:l:=s[2]:m:=s[3]:
```

```
> sols:=
  [solve(k*x^2+l*x+m=0,x)];
```

$$sols := [.5615026996, 1.522332222]$$

```
> q1:=sols[1];q2:=sols[2];
```

$$q1 := .5615026996$$

$$q2 := 1.522332222$$

```
> x0:=x0;x1:=x1;x2:=x2;q1:=q1;q2:
  =q2;
```

$$x0 := 1.$$

$$x1 := 2.$$

$$x2 := 1.366025404$$

$$q1 := .5615026996$$

$$q2 := 1.522332222$$

```
> sort([x0,x1,x2,q1,q2]);
```

$[.5615026996, 1., 1.366025404, 1.522332222,$
$2.]$

```
> p(1.522332223);
```

$$-.038998749$$

```
> # ----------------Next Iteration
  ----------------
```

```
> x0:=x2:x2:=x1:x1:=q2:
```

```
> p0:=p(x0);p1:=p(x1);p2:=p(x2);
```

$$p0 := -.549038105$$

$$p1 := -.038998753$$

$$p2 := 3.$$

```
> x02:=x0^2:x12:=x1^2:x22:=x2^2:
```

```
> A := matrix(
  [[x02,x0,1],[x12,x1,1],[x22,x2,
  1]] ):
  b := vector( [p0,p1,p2]):
  s:=linsolve(A, b);
```

$$s :=$$

$$[4.888357645, -10.85625981, 5.159089039]$$

```
> 
> k:=s[1]:l:=s[2]:m:=s[3]:
> sols:=
  [solve(k*x^2+l*x+m=0,x)];
```

$$sols := [.6889349725, 1.531904949]$$

```
> q1:=sols[1];q2:=sols[2];
```

$$q1 := .6889349725$$

$$q2 := 1.531904949$$

```
> x0:=x0;x1:=x1;x2:=x2;q1:=q1;q2:
  =q2;
```

$$x0 := 1.366025404$$

$$x1 := 1.522332222$$

$$x2 := 2.$$

$$q1 := .6889349725$$

$$q2 := 1.531904949$$

```
> sort([x0,x1,x2,q1,q2]);
```

$$[.6889349725, 1.366025404, 1.522332222,$$

$$1.531904949, 2.]$$

```
> p(1.531904949);
```

$$-.000743298$$

```
> # ----------------Next Iteration
  ----------------
```

```
> x0:=x1:x1:=q2:x2:=x2:
```

```
> p0:=p(x0);p1:=p(x1);p2:=p(x2);
```

$$p0 := -.038998753$$

$$p1 := -.000743298$$

$$p2 := 3.$$

```
> x02:=x0^2:x12:=x1^2:x22:=x2^2:
```

```
> A := matrix(
  [[x02,x0,1],[x12,x1,1],[x22,x2,
  1]] ):
  b := vector( [p0,p1,p2]):
  s:=linsolve(A, b);
```

$$s :=$$

$$[5.054238537, -11.44054742, 5.664140691]$$

```
>
```

```
> k:=s[1]:l:=s[2]:m:=s[3]:
```

```
> sols:=
  [solve(k*x^2+l*x+m=0,x)];
```

$$sols := [.7314664203, 1.532088680]$$

```
> q1:=sols[1];q2:=sols[2];
```

$$q1 := .7314664203$$

$$q2 := 1.532088680$$

```
> x0:=x0;x1:=x1;x2:=x2;q1:=q1;q2:
  =q2;
```

$$x0 := 1.522332222$$

$$x1 := 1.531904949$$

$$x2 := 2.$$

$$q1 := .7314664203$$

$$q2 := 1.532088680$$

```
> sort([x0,x1,x2,q1,q2]);
```

$$[.7314664203, 1.522332222, 1.531904949,$$

$$1.532088680, 2.]$$

```
> p(1.532088679);
```

$$-.838 \ 10^{-6}$$

```
> # --------------------Next
  Iteration -----------------
```

```
> p0:=p(x0);p1:=p(x1);p2:=p(x2);
```

$$p0 := -.038998753$$

$$p1 := -.000743298$$

$$p2 := 3.$$

```
> x02:=x0^2:x12:=x1^2:x22:=x2^2:
```

```
> A := matrix(
  [[x02,x0,1],[x12,x1,1],[x22,x2,
  1]] ):
  b := vector( [p0,p1,p2]):
  s:=linsolve(A, b);
```

$$s :=$$

$$[5.054238537, -11.44054742, 5.664140691]$$

```
>
```

```
> k:=s[1]:l:=s[2]:m:=s[3]:
```

```
> sols:=
  [solve(k*x^2+l*x+m=0,x)];
```

$$sols := [.7314664203, 1.532088680]$$

```
> q1:=sols[1];q2:=sols[2];
```

$$q1 := .7314664203$$

$$q2 := 1.532088680$$

```
> x0:=x0;x1:=x1;x2:=x2;q1:=q1;q2:
  =q2;
```

$$x0 := 1.522332222$$

$$x1 := 1.531904949$$

$$x2 := 2.$$

$$q1 := .7314664203$$

$$q2 := 1.532088680$$

```
> sort([x0,x1,x2,q1,q2]);
```

$$[.7314664203, 1.522332222, 1.531904949,$$
$$1.532088680, 2.]$$

```
> p(1.532088679);
```

$$-.838 \; 10^{-6}$$

```
> # -------------------Next
  Iteration -----------------
```

```
> x0:=x1:x1:=q2:x2:=x2:
```

```
> p0:=p(x0);p1:=p(x1);p2:=p(x2);
```

$$p0 := -.000743298$$

$$p1 := -.834 \; 10^{-6}$$

$$p2 := 3.$$

```
> x02:=x0^2:x12:=x1^2:x22:=x2^2:
```

```
> A := matrix(
  [[x02,x0,1],[x12,x1,1],[x22,x2,
  1]] ):
  b := vector( [p0,p1,p2]):
  s:=linsolve(A, b);
```

$$s :=$$
$$[5.064023375, -11.47510655, 5.694119603]$$

```
> 
> k:=s[1]:l:=s[2]:m:=s[3]:
> sols:=
  [solve(k*x^2+l*x+m=0,x)];
```

$$sols := [.7339169556, 1.532088886]$$

```
> q1:=sols[1];q2:=sols[2];
```

$$q1 := .7339169556$$

$$q2 := 1.532088886$$

```
> x0:=x0;x1:=x1;x2:=x2;q1:=q1;q2:
  =q2;
```

$$x0 := 1.531904949$$

$$x1 := 1.532088680$$

$$x2 := 2.$$

$$q1 := .7339169556$$

$$q2 := 1.532088886$$

```
> sort([x0,x1,x2,q1,q2]);
```

$$[.7339169556, 1.531904949, 1.532088680,$$
$$1.532088886, 2.]$$

```
> p(1.532088886);
```

$$-.1 \ 10^{-8}$$

```
> 
```