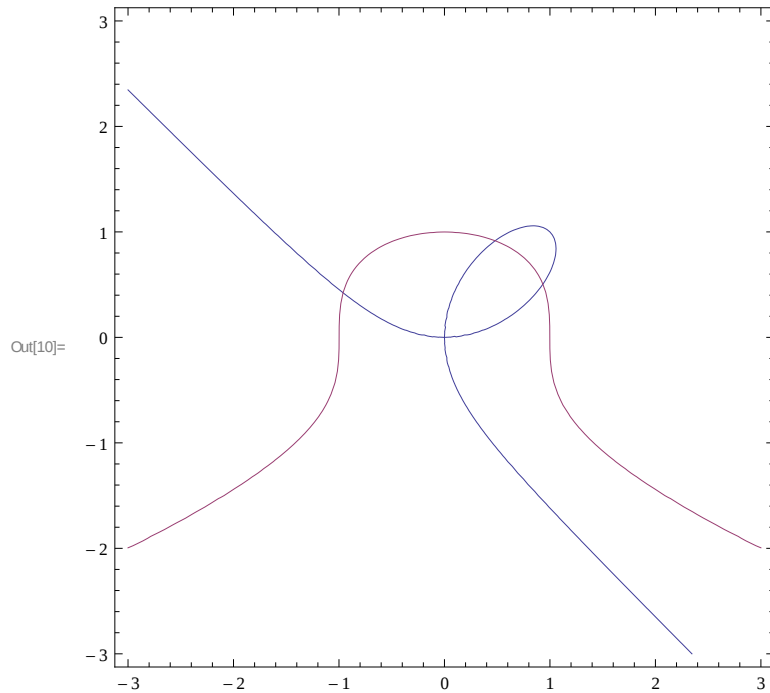


```
In[1]:= f1 = x ^ 3 + y ^ 3 - 2 x y;
f2 = x ^ 2 + y ^ 3 - 1;
```

```
In[10]:= ContourPlot[{f1 == 0, f2 == 0}, {x, -3, 3}, {y, -3, 3}]
```



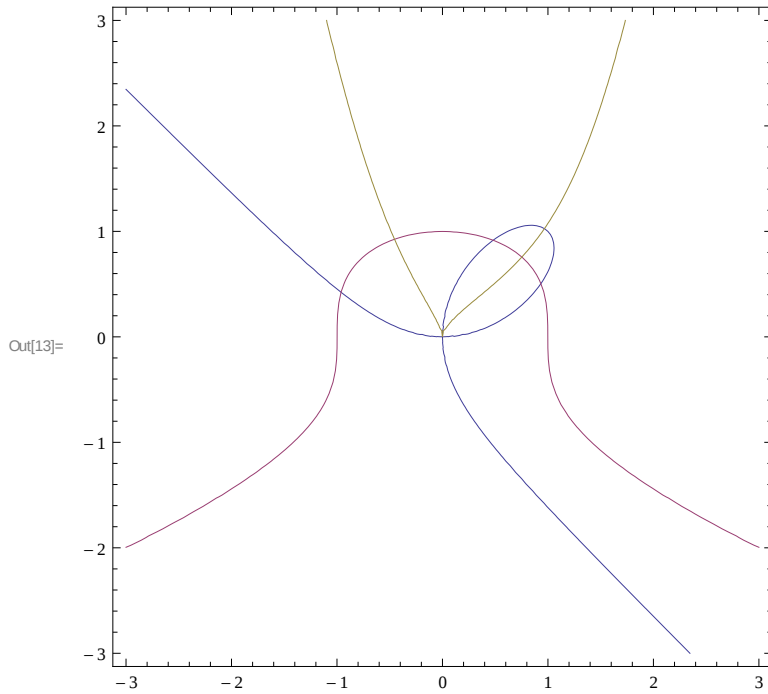
```
In[11]:= Solve[{f1 == 0, f2 == 0}, {x, y}, Reals] // N
```

```
Out[11]= {{x -> -0.961449, y -> 0.422868}, {x -> 0.480254, y -> 0.91631}, {x -> 0.933563, y -> 0.504571}}
```

```
In[12]:= jac = D[{f1, f2}, {{x, y}}]
```

```
Out[12]= {{3 x ^ 2 - 2 y, -2 x + 3 y ^ 2}, {2 x, 3 y ^ 2}}
```

In[13]:= **ContourPlot** [{f1 == 0, f2 == 0, Det[jac] == 0}, {x, -3, 3}, {y, -3, 3}]



In[14]:= **newton** [{x0_, y0_}] := ({x, y} - Inverse[jac].{f1, f2}) /. {x → x0, y → y0}

In[15]:= **newton** [{a, b}] // **Simplify**

Out[15]=
$$\left\{ \frac{-3 b^2 - 3 a^2 b^2 + a^3 (2 + 6 b^2) - 2 a (-1 + b^3)}{-6 a b^2 - 6 b^3 + a^2 (4 + 9 b^2)}, -\frac{a^4 + 4 a b^3 - a^2 (3 + 2 b + 6 b^3) + 2 (b + 2 b^4)}{-6 a b^2 - 6 b^3 + a^2 (4 + 9 b^2)} \right\}$$

In[16]:= **NestList** [newton, {1., 1.}, 9] // **TableForm**

Out[16]//TableForm=

1.	1.
2.	0.
1.25	-0.25
0.991614	0.278485
0.963824	0.49433
0.934605	0.503295
0.933566	0.504568
0.933563	0.504571
0.933563	0.504571
0.933563	0.504571

In[17]:= **newton2** [{x_, y_}] := **N** [newton [{x, y}], 30];

```
In[18]:= NestList[newton2, {1, 1}, 13] // TableForm
```

```
Out[18]//TableForm=
```

1	1
2.00000000000000000000000000000000	0
1.25000000000000000000000000000000	-0.25000000000000000000000000000000
0.9916136495083863504916136495	0.278484673221515326778484673
0.963823636603431120742868321	0.494329751315127559530132236
0.93460466081812646427784447	0.50329530293210632652139399
0.93356634790253437207289300	0.5045680060715400616554152
0.9335632787937611346663854	0.5045708925622964871107368
0.9335632787731841291106453	0.504570892583753709872048
0.933563278773184129109626	0.504570892583753709873072
0.93356327877318412910963	0.50457089258375370987307
0.93356327877318412910963	0.5045708925837537098731
0.9335632787731841291096	0.5045708925837537098731
0.933563278773184129110	0.504570892583753709873