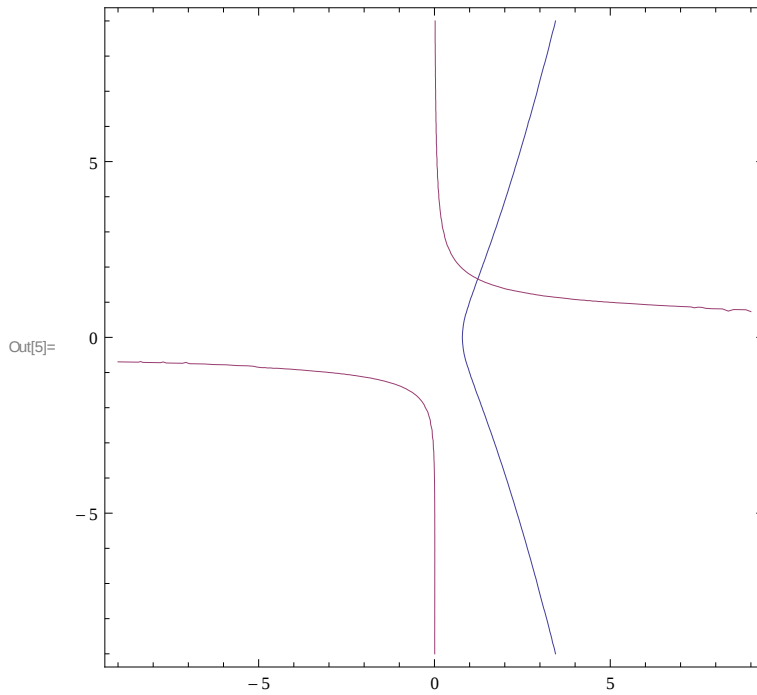


```
In[1]:= f1 = 2 x ^ 3 - y ^ 2 - 1;  
f2 = x y ^ 3 - y - 4;
```

```
In[5]:= ContourPlot[{f1 == 0, f2 == 0}, {x, -9, 9}, {y, -9, 9}]
```



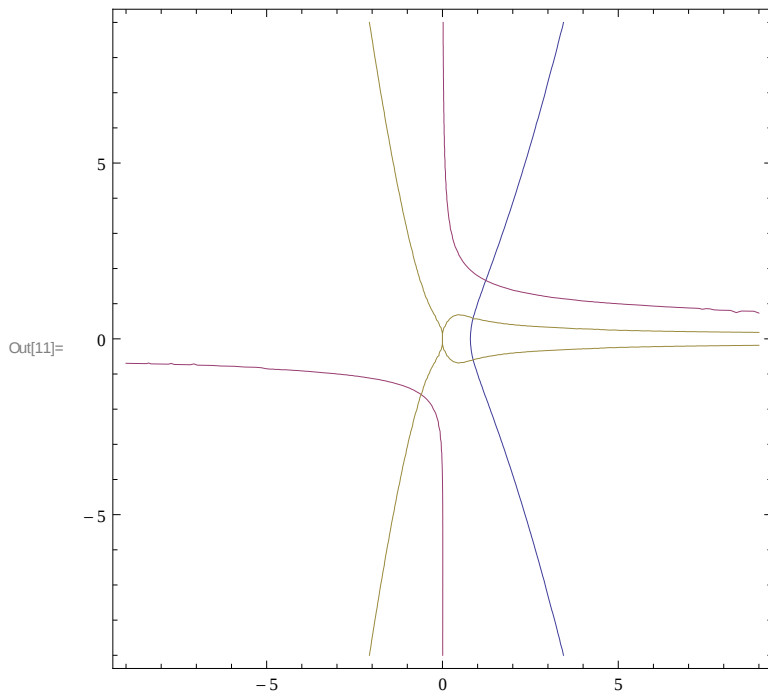
```
In[9]:= Solve[{f1 == 0, f2 == 0}, {x, y}, Reals] // N
```

```
Out[9]= {{x -> 1.23427, y -> 1.66153}}
```

```
In[10]:= jac = D[{f1, f2}, {{x, y}}]
```

```
Out[10]= {{6 x ^ 2, -2 y}, {y ^ 3, -1 + 3 x y ^ 2}}
```

```
In[11]:= ContourPlot[{f1 == 0, f2 == 0, Det[jac] == 0}, {x, -9, 9}, {y, -9, 9}]
```



```
In[12]:= newton[{x0_, y0_}] := ({x, y} - Inverse[jac].{f1, f2}) /. {x -> x0, y -> y0}
```

```
In[14]:= newton[{a, b}] // Simplify
```

Out[14]=

$$\left\{ \frac{-1 - 4 a^3 + 8 b + b^2 + 12 a^4 b^2 + 3 a (b^2 + b^4)}{2 (-3 a^2 + 9 a^3 b^2 + b^4)}, \frac{24 a^2 - b^3 + 14 a^3 b^3 + b^5}{2 (-3 a^2 + 9 a^3 b^2 + b^4)} \right\}$$

```
In[19]:= NestList[newton, {1., 1.}, 9] // TableForm
```

Out[19]//TableForm=

1.	1.
1.57143	2.71429
1.38455	2.09254
1.27277	1.7685
1.2374	1.67019
1.2343	1.66159
1.23427	1.66153
1.23427	1.66153
1.23427	1.66153
1.23427	1.66153

```
In[23]:= newton2[{x_, y_}] := N[newton[{x, y}], 30];
```

```
In[25]:= NestList[newton2, {1, 1}, 13] // TableForm
```

```
Out[25]//TableForm=
```

1	1
1.57142857142857142857142857143	2.71428571428571428571428571429
1.38455347014688991079778764899	2.0925353035910282098143699421
1.2727692557710431970584967112	1.7685043182087797188591249055
1.2374014873112312334811040008	1.670187860178997027443972714
1.234296954632029077863944952	1.661589010654412439081172230
1.234274485290438337330913638	1.661526470082484508467078021
1.23427448411447599735906284	1.66152646679593389838447288
1.23427448411447599412386877	1.66152646679593388931695042
1.2342744841144759941238688	1.6615264667959338893169504
1.2342744841144759941238688	1.6615264667959338893169504
1.234274484114475994123869	1.661526466795933889316950
1.234274484114475994123869	1.661526466795933889316950
1.23427448411447599412387	1.66152646679593388931695