

```

In[ ]:= p := ContourPlot[{x^2 + y^2/4 == 5/16, x^2 + y^2/4 == 9/25 * 5/16,
  x^2 + y^2/4 == (9/25)^2 * 5/16, x^2 + y^2/4 == (9/25)^3 * 5/16,
  x^2 + y^2/4 == (9/25)^4 * 5/16, x^2 + y^2/4 == (9/25)^5 * 5/16},
{x, -0.7, 0.7}, {y, -1.2, 1.3}, AspectRatio -> 25/14]

```

```

In[ ]:=
a2 := VectorPlot[{-2 * x, -y/2}, {x, -0.7, 0.7},
  {y, -1.2, 1.3}, AspectRatio -> 25/14, Frame -> False];
a4 := Graphics[{Thick, Blue, Arrow[{{1/4, 1}, {-11/20, 1/5}}],
  Text[Style["(x,y)", Large], {2/5, 1.1}],
  Text[Style["s", Large], {-12/20, 1/5}],
  Text[Style["Gradient Descent: learning rate" ,
  Medium, Background -> LightRed], {0, 1.3}]}];
a5 := Graphics[{Thick, Blue, Arrow[{{1/4, 1}, {-11/20, 1/5}}],
  Text[Style["(x,y)", Large], {2/5, 1.1}],
  Text[Style["s", Large], {-12/20, 1/5}],
  Text[Style["Gradient Descent: learning rate" ,
  Medium, Background -> LightRed], {0, 1.3}]}];
a6 := Graphics[{Arrow[{{1/4, 1}, {-3/5/4, (3/5)}}],
  Text[Style["Gradient Descent: learning rate" ,
  Medium, Background -> LightRed], {0, 1.3}]}];

```

```

In[ ]:= b3 = ParametricPlot[{Exp[-2 * t]/4, Exp[-t/2]},
  {t, -4 * Log[10/7], 20}, Frame -> False, PlotStyle -> Red, AspectRatio -> 1/4];
b4 := ListPlot[{{1/4, 1}}, PlotStyle -> {Black, PointSize[Large]}, Axes -> None];
b5 := ListPlot[{{1/4, 1}}, PlotStyle -> {Black, PointSize[Large]}, Axes -> None];
b7 := Graphics[{Arrow[{{(-3/5)/4, (3/5)}, {(-3/5)^2/4, (3/5)^2}}]}];

```

```

In[ ]:= c5 := ListPlot[{{(-3/5)/4, (3/5)}}, PlotStyle -> {Red, PointSize[Large]}, Axes -> None];
c8 := Graphics[{Arrow[{{(-3/5)^2/4, (3/5)^2}, {(-3/5)^3/4, (3/5)^3}}]}];

```

```

In[ ]:= d9 := Graphics[{Arrow[{{(-3/5)^3/4, (3/5)^3}, {(-3/5)^4/4, (3/5)^4}}]}];

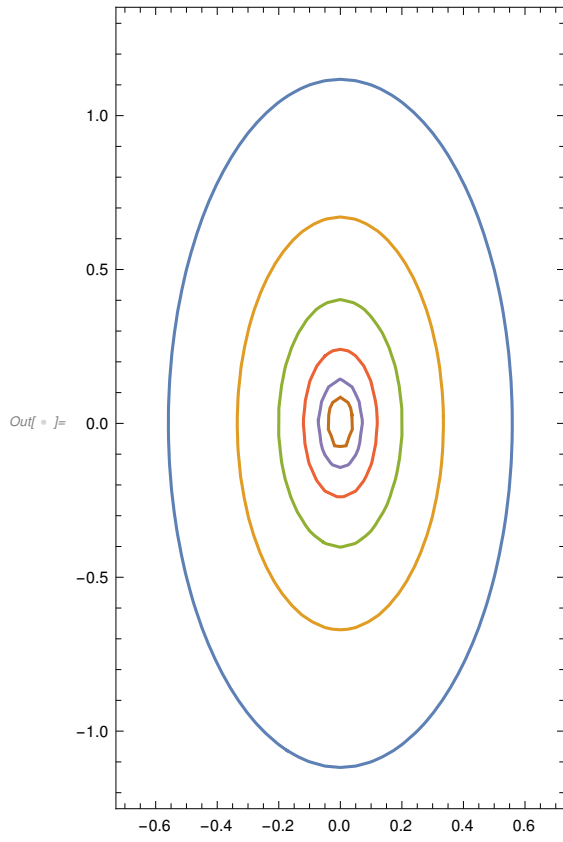
```

```

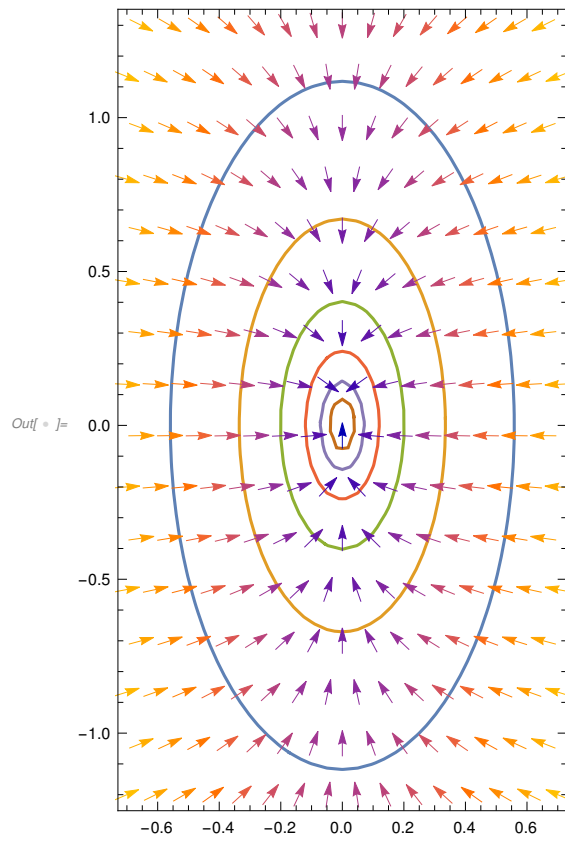
In[ ]:= e10 := Graphics[{Arrow[{{(-3/5)^4/4, (3/5)^4}, {(-3/5)^5/4, (3/5)^5}}]}];

```

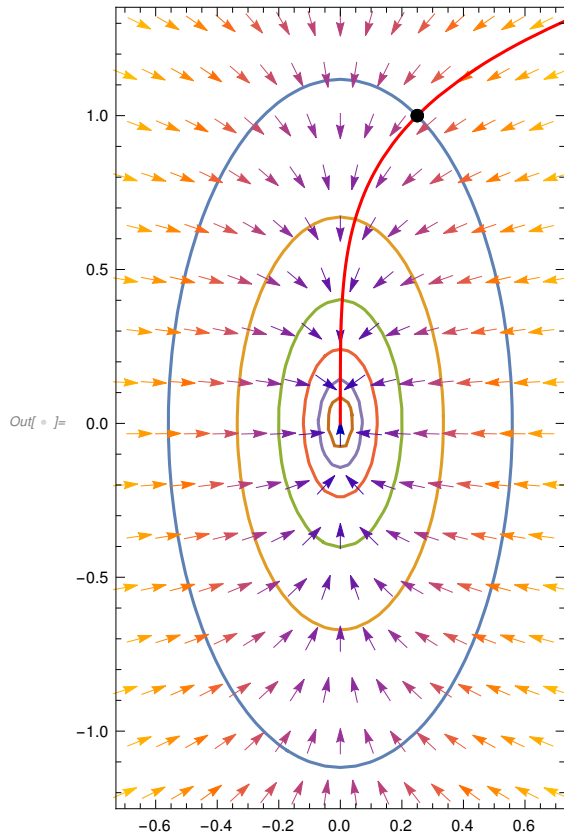
In[*]:= Show[p]



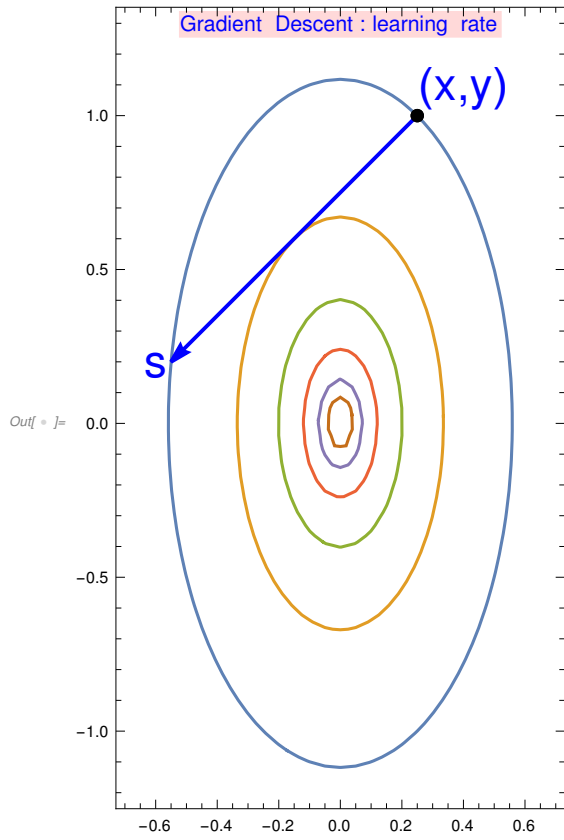
In[*]:= Show[p, a2]



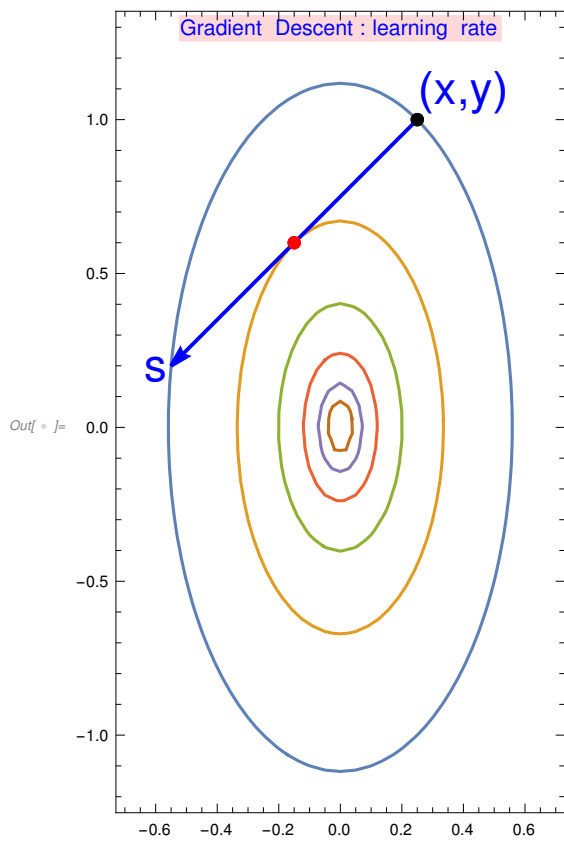
In[]:= Show[p, a2, b3, b4]



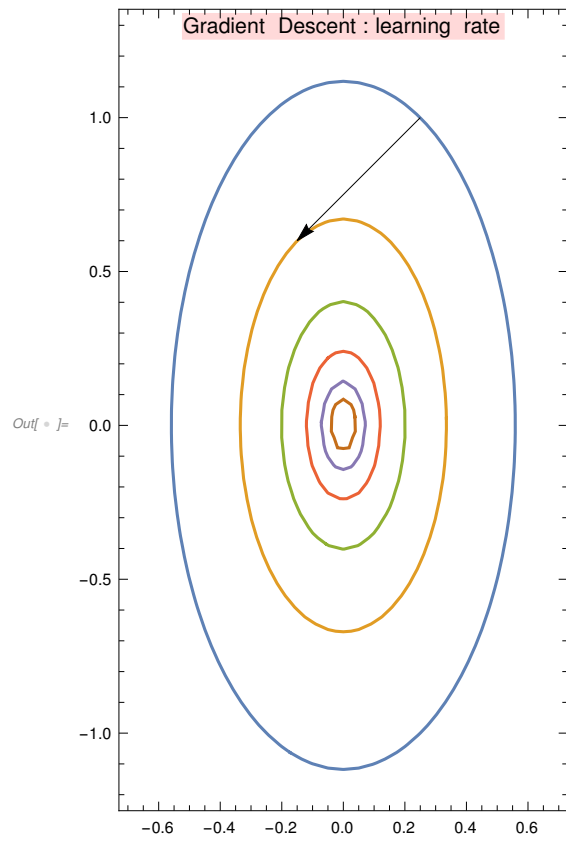
In[*]:= Show[p, a4, b4]



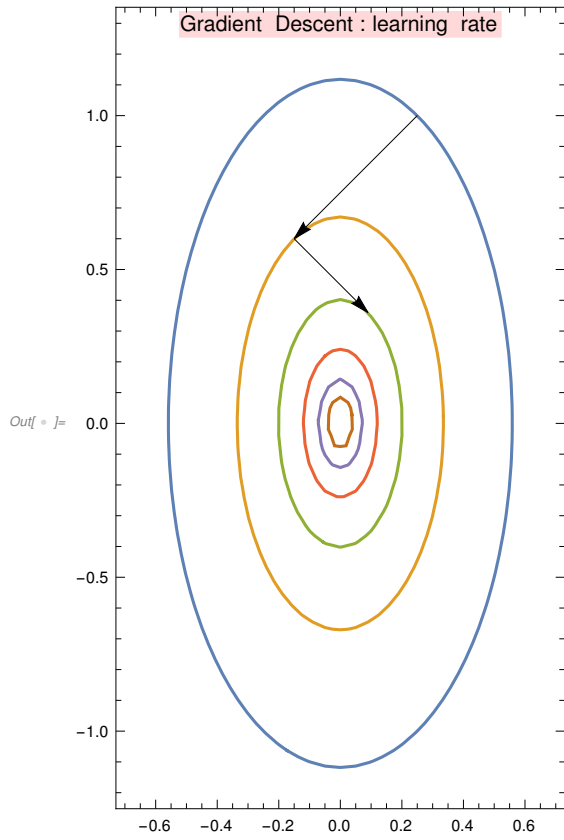
In[]:= Show[p, a5, b5, c5]



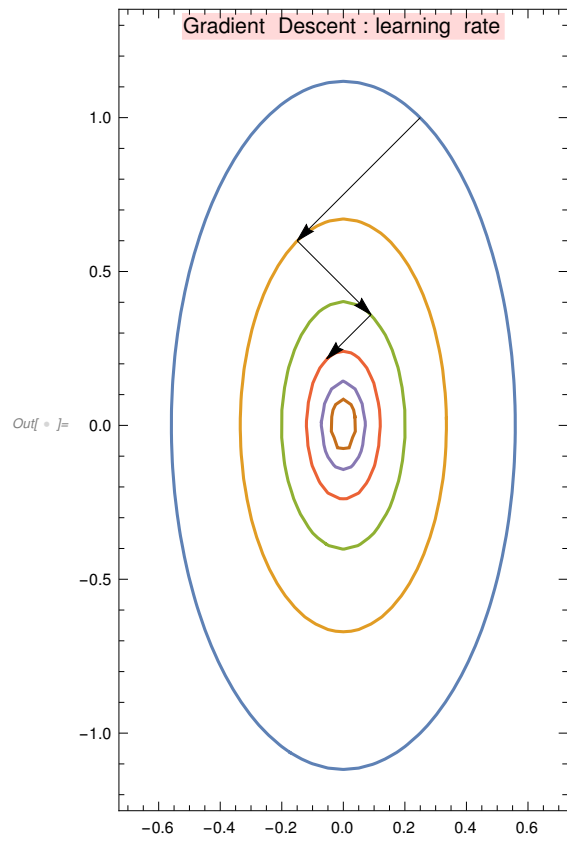
In[]:= Show[p, a6]



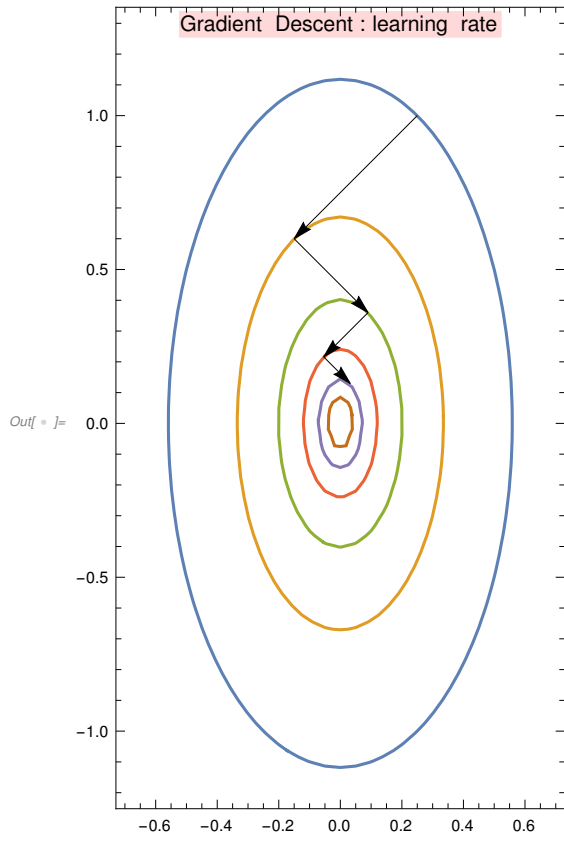
In[]:= Show[p, a6, b7]



In[]:= Show[p, a6, b7, c8]



In[*]:= Show[p, a6, b7, c8, d9]



```
In[ * ]:= Show[p, a6, b7, c8, d9, e10]
```

