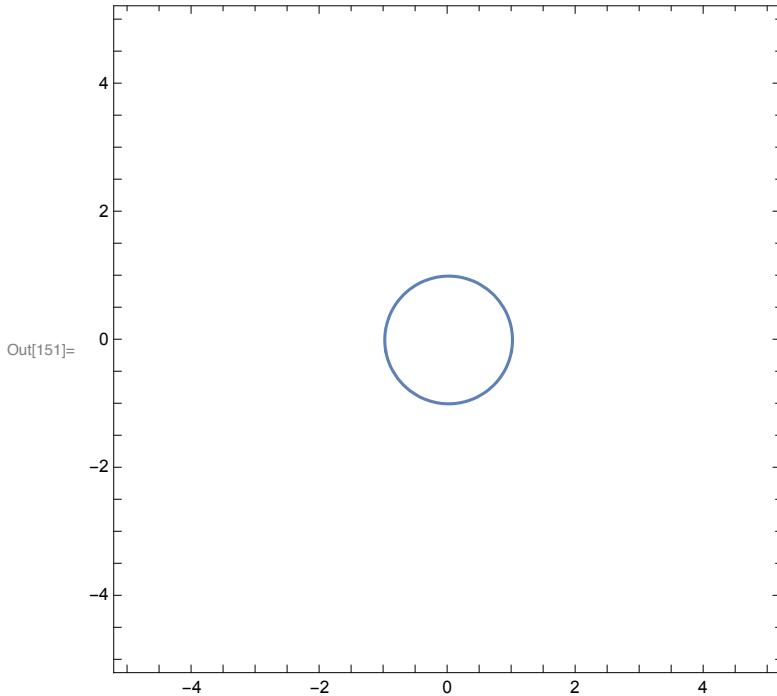


欧式平面中的二次曲线和欧式空间中的二次曲面之图画

(* 两特征值均非零且同号, 椭圆型: $\lambda_1 x^2 + \lambda_2 y^2 + c = 0$ *)

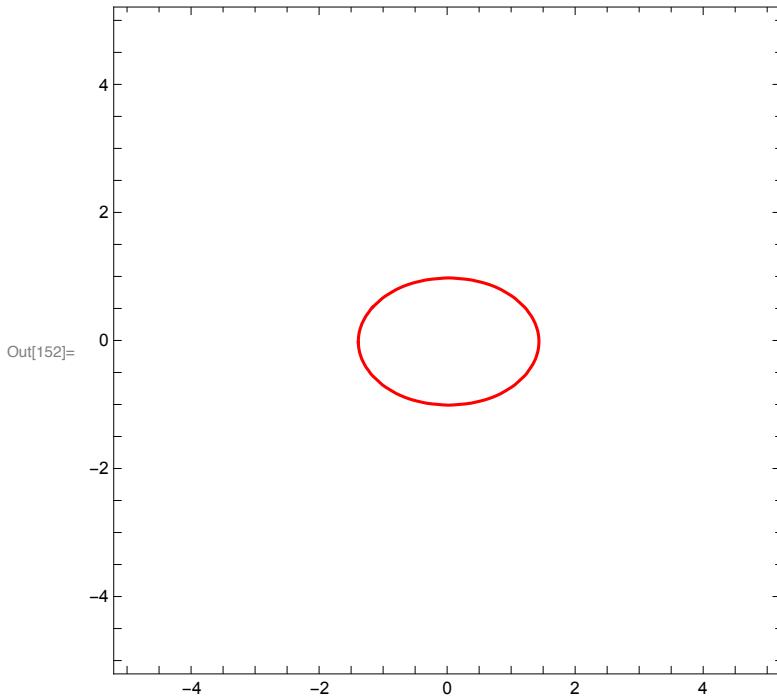
(* Example-1. 椭圆, 单位圆周 *)

```
ContourPlot[x^2 + y^2 == 1, {x, -5, 5}, {y, -5, 5}]
```



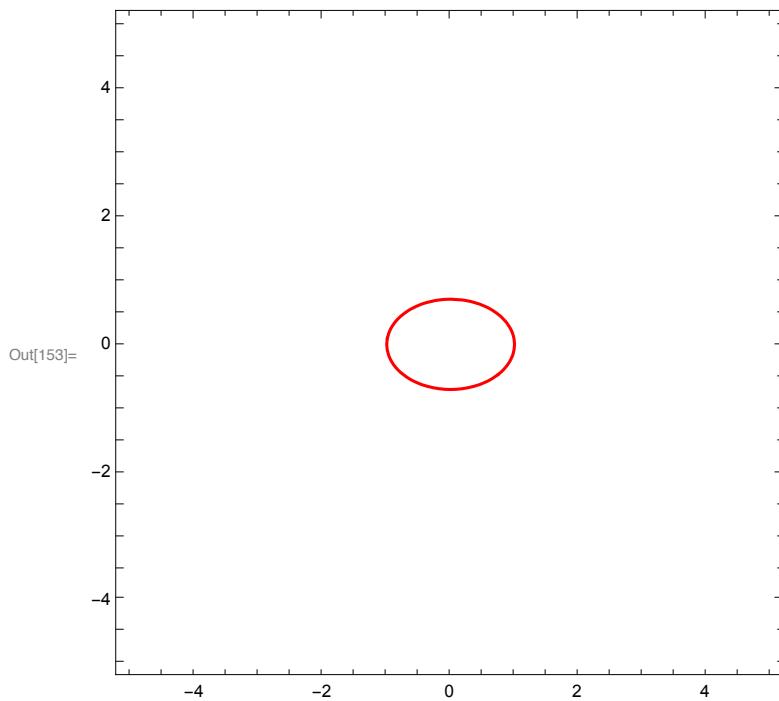
In[152]:= (* Example-2. 椭圆 *)

```
ContourPlot[x^2 / 2 + y^2 == 1, {x, -5, 5}, {y, -5, 5}, ContourStyle -> {Red}]
```



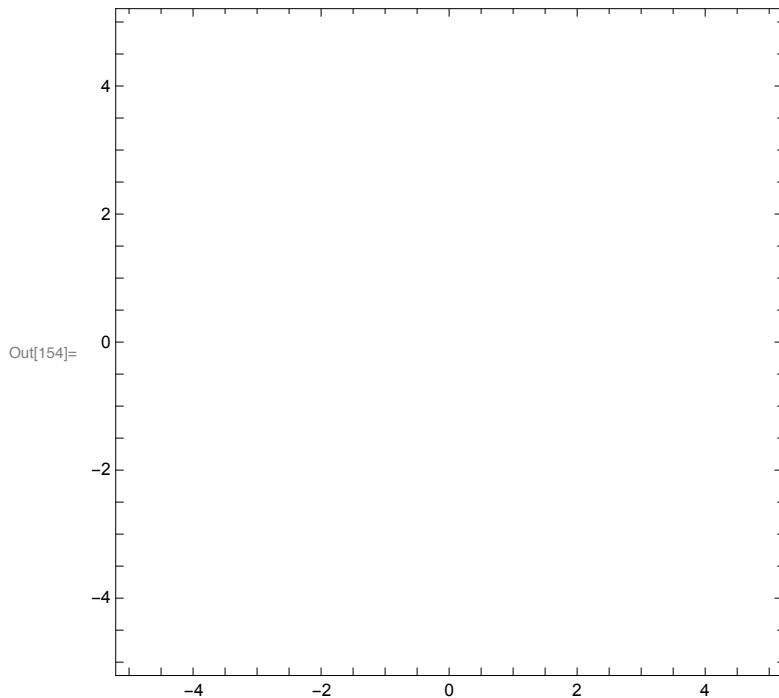
In[153]:= (* Example-3. 椭圆 *)

```
ContourPlot[x^2 / 2 + y^2 == 1 / 2, {x, -5, 5}, {y, -5, 5}, ContourStyle -> {Red}]
```

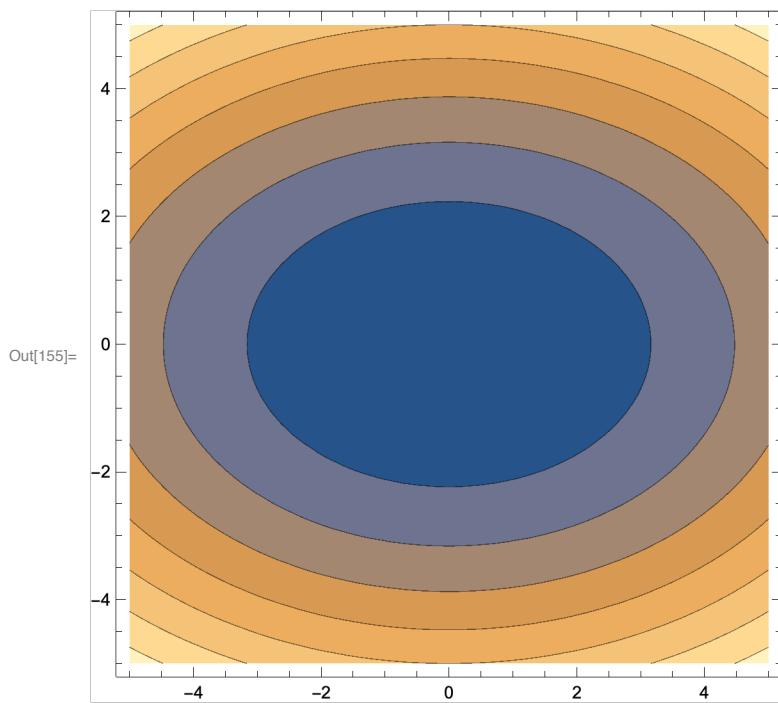


In[154]:= (* Example-4. 单点 *)

```
ContourPlot[x^2 / 2 + y^2 == 0, {x, -5, 5}, {y, -5, 5}, ContourStyle -> {Red}]
```



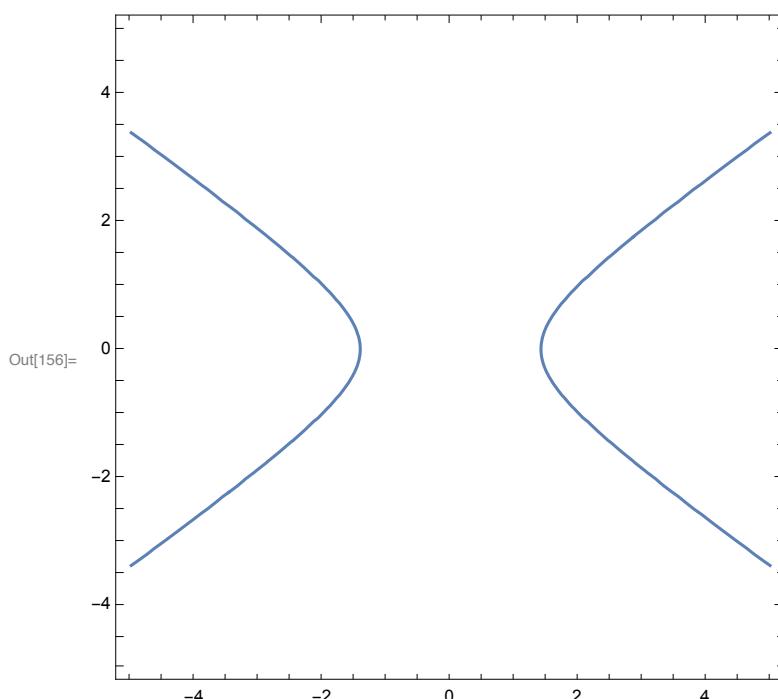
In[155]:= `ContourPlot[x^2 / 2 + y^2, {x, -5, 5}, {y, -5, 5}]`



(* 两特征值均非零且异号, 双曲线: $\lambda_1 x^2 + \lambda_2 y^2 + c = 0$ *)

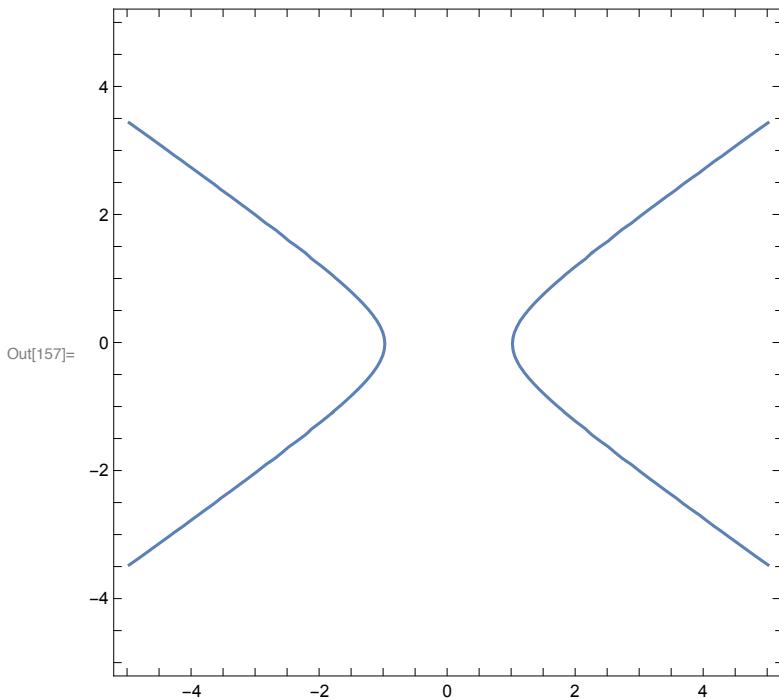
(* Example-1. 双曲线 *)

`ContourPlot[x^2 / 2 - y^2 == 1, {x, -5, 5}, {y, -5, 5}]`



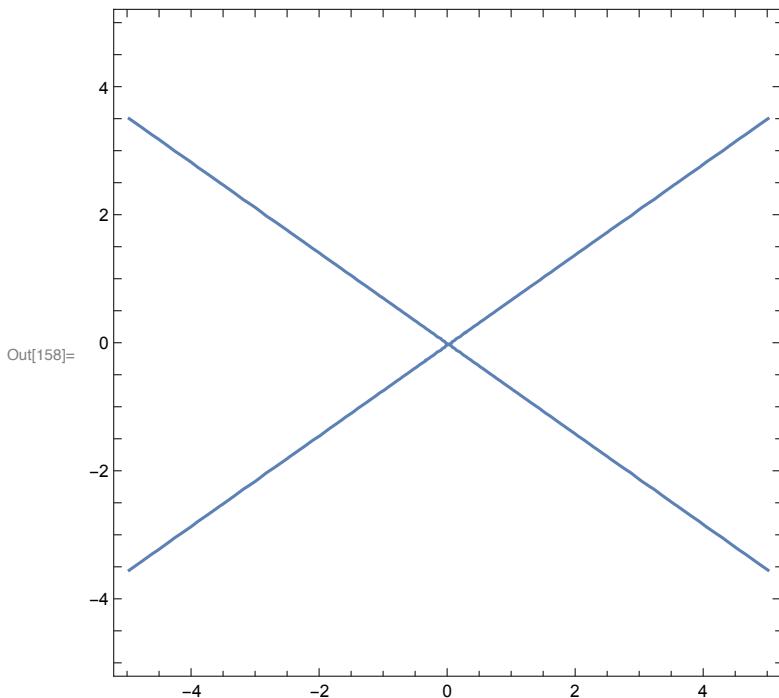
(* Example-2. 双曲线 *)

```
ContourPlot[x^2 / 2 - y^2 == 1 / 2, {x, -5, 5}, {y, -5, 5}]
```



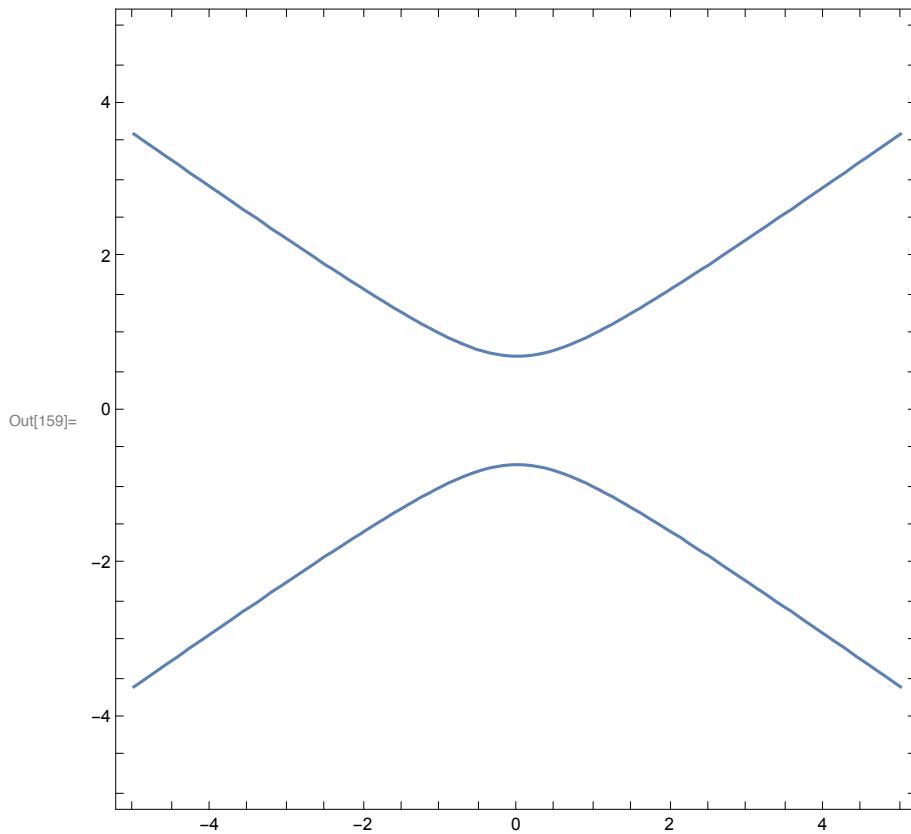
(* Example-3. 两条直线 *)

```
ContourPlot[x^2 / 2 - y^2 == 0, {x, -5, 5}, {y, -5, 5}]
```

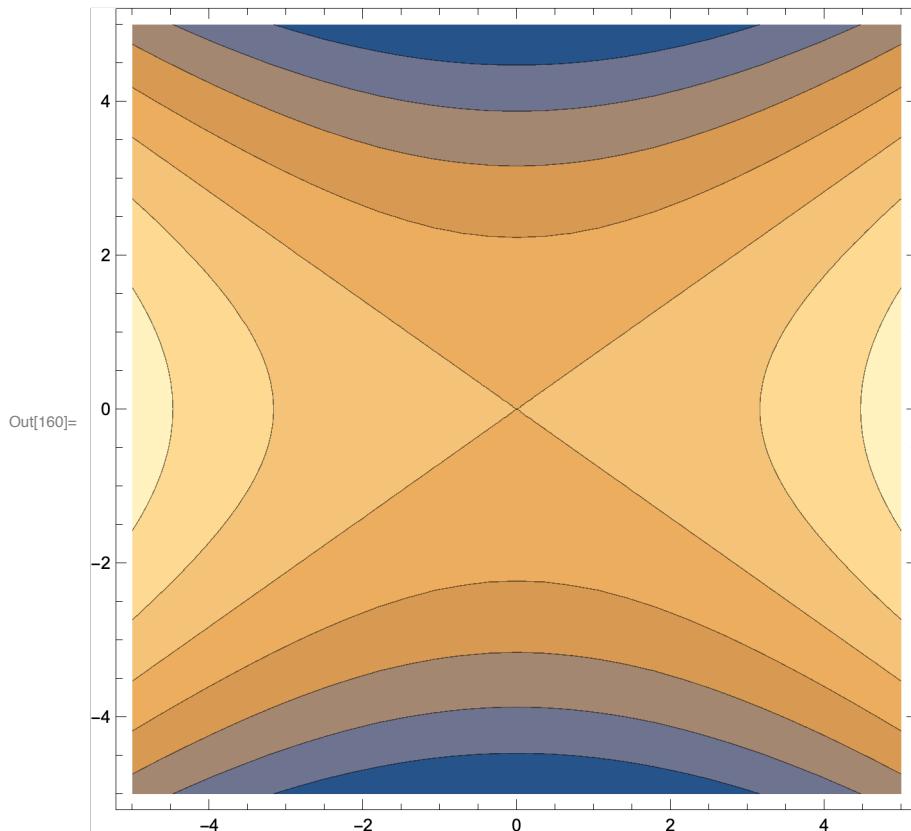


(* Example-4. 双曲线 *)

```
ContourPlot[x^2 / 2 - y^2 == -1 / 2, {x, -5, 5}, {y, -5, 5}]
```



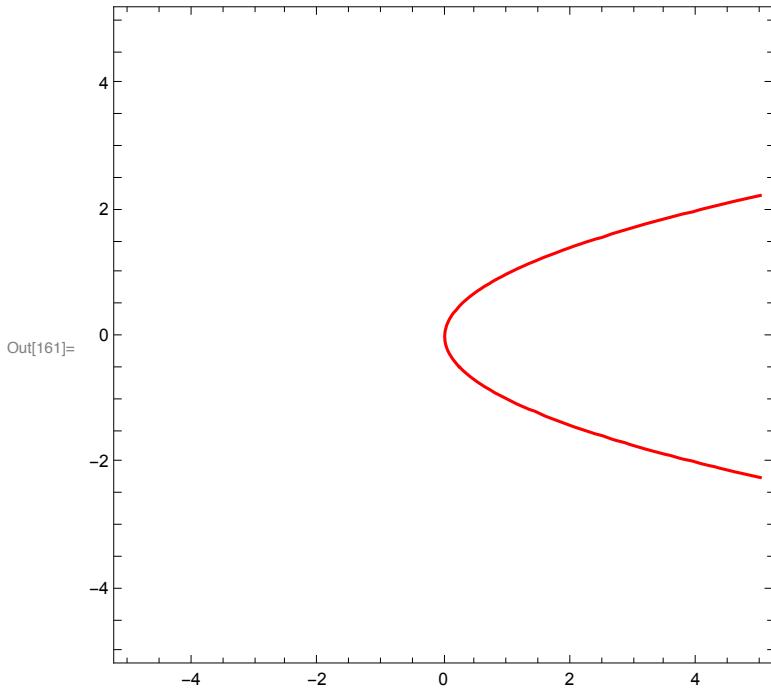
```
In[160]:= ContourPlot[x^2 / 2 - y^2, {x, -5, 5}, {y, -5, 5}]
```



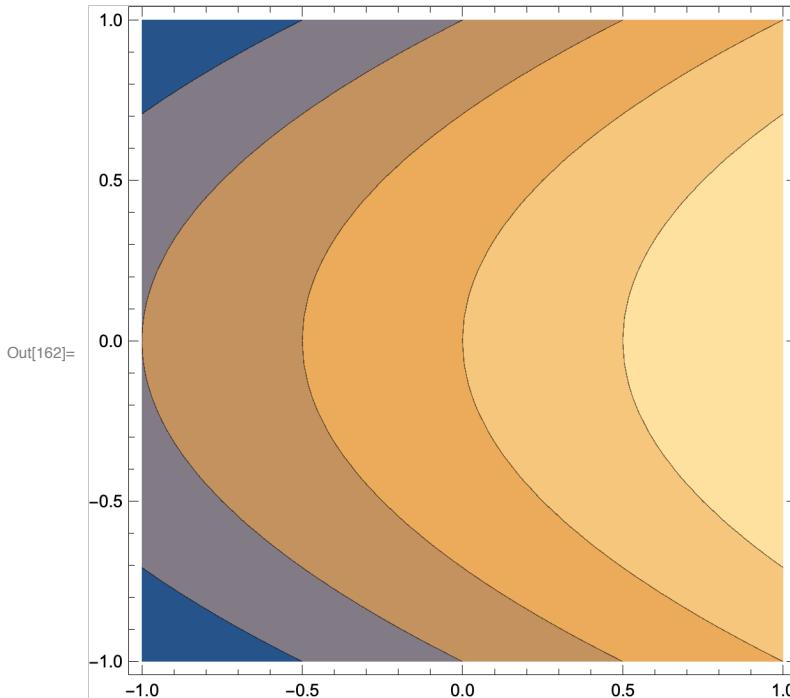
(* 一个特征值为零, 抛物型 *)

(* Example. 抛物线 *)

```
ContourPlot[x - y^2 == 0, {x, -5, 5}, {y, -5, 5}, ContourStyle -> {Red}]
```



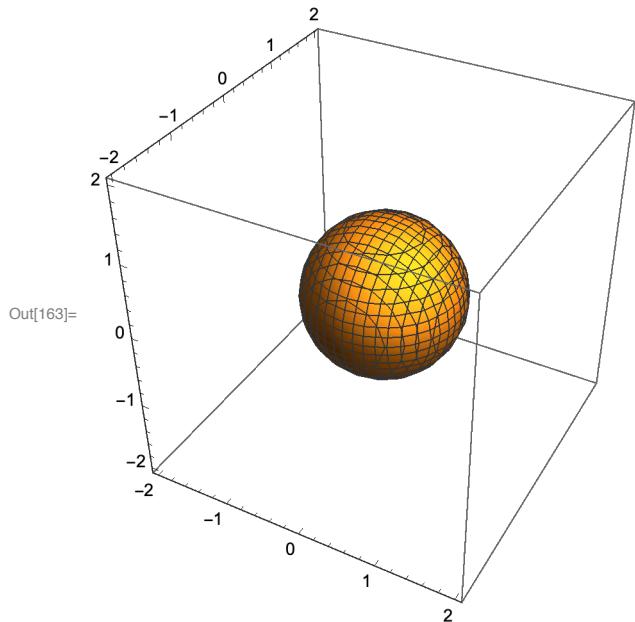
```
In[162]:= ContourPlot[x - y^2, {x, -1, 1}, {y, -1, 1}]
```



(* 三个特征值均非零且同号, 椭球型: $\lambda_1 x^2 + \lambda_2 y^2 + \lambda_3 z^2 + c = 0$ *)

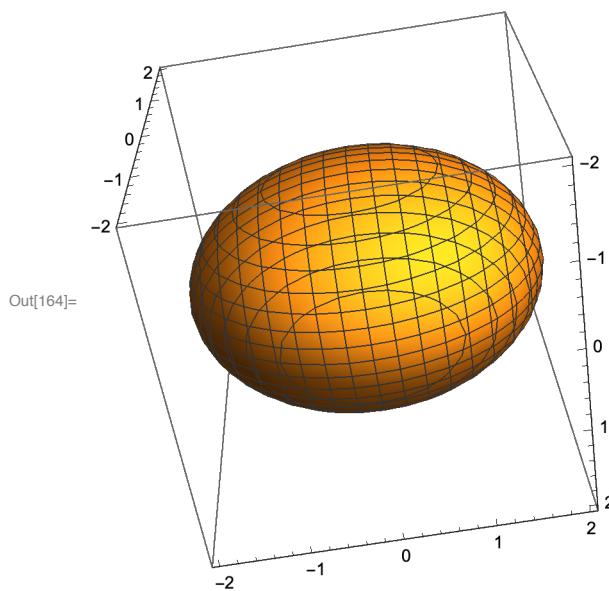
(* Example-1. 椭球面之单位球面 *)

```
ContourPlot3D[x^2 + y^2 + z^2 == 1, {x, -2, 2}, {y, -2, 2}, {z, -2, 2}]
```



In[164]:= (* Example-2. 椭球面 *)

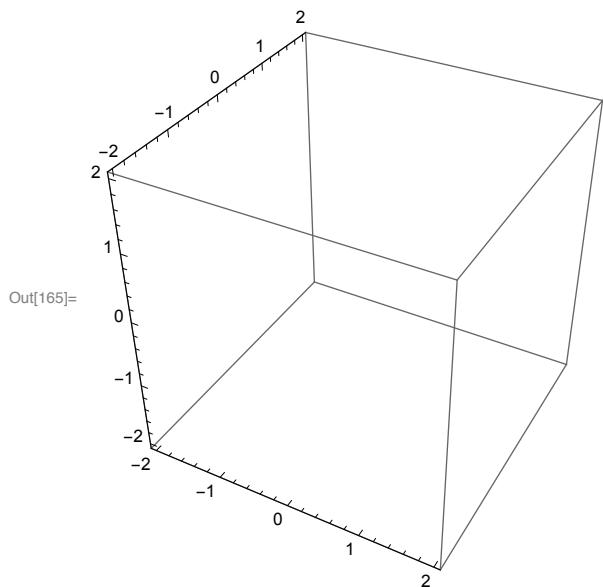
```
ContourPlot3D[1/2 x^2 + 1/3 y^2 + 1/4 z^2 == 1,
{x, -2, 2}, {y, -2, 2}, {z, -2, 2}]
```



In[165]:= (* Example-3. 单点 *)

```
ContourPlot3D[1/2 x^2 + 1/3 y^2 + 1/4 z^2 == 0,
```

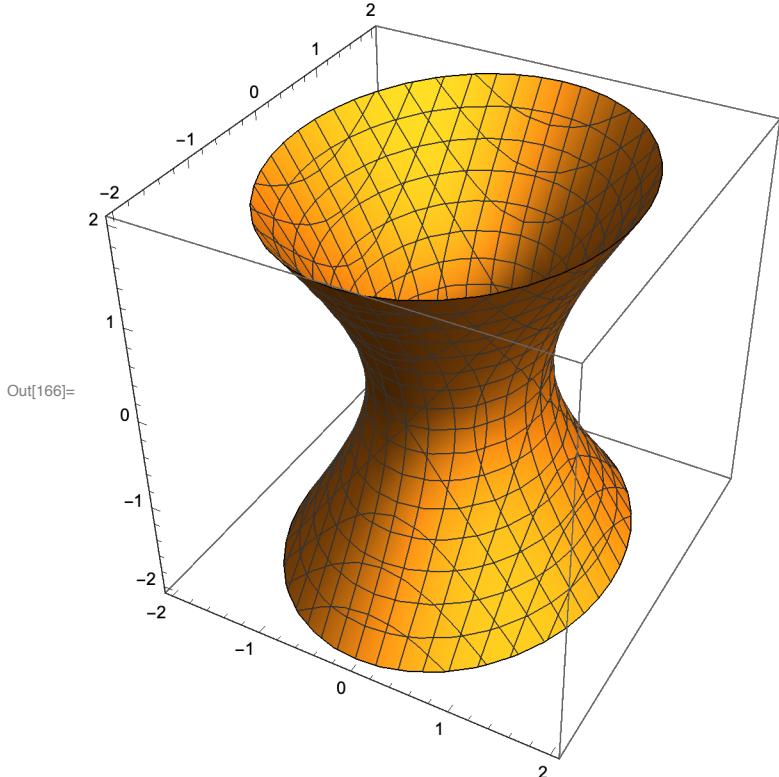
```
{x, -2, 2}, {y, -2, 2}, {z, -2, 2}]
```



(* 三个特征值均非零，且不同号，双曲型: $\lambda_1 x^2 + \lambda_2 y^2 + \lambda_3 z^2 + c = 0$ *)

(* Example-1. 单叶双曲面 *)

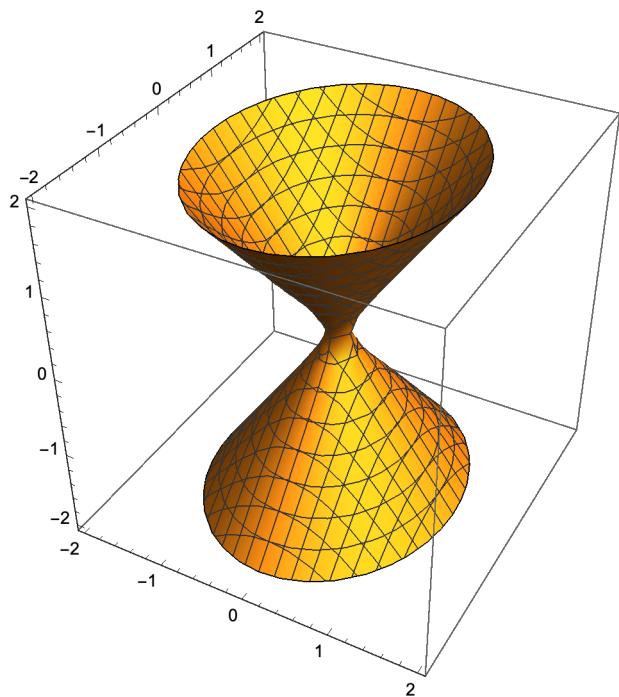
```
ContourPlot3D[1/2 x^2 + 1/3 y^2 - 1/4 z^2 == 1/3,
{x, -2, 2}, {y, -2, 2}, {z, -2, 2}]
```



In[167]:= (* Example-2. 单叶双曲面 *)

```
ContourPlot3D[1/2 x^2 + 1/3 y^2 - 1/4 z^2 == 1/100,
{x, -2, 2}, {y, -2, 2}, {z, -2, 2}]
```

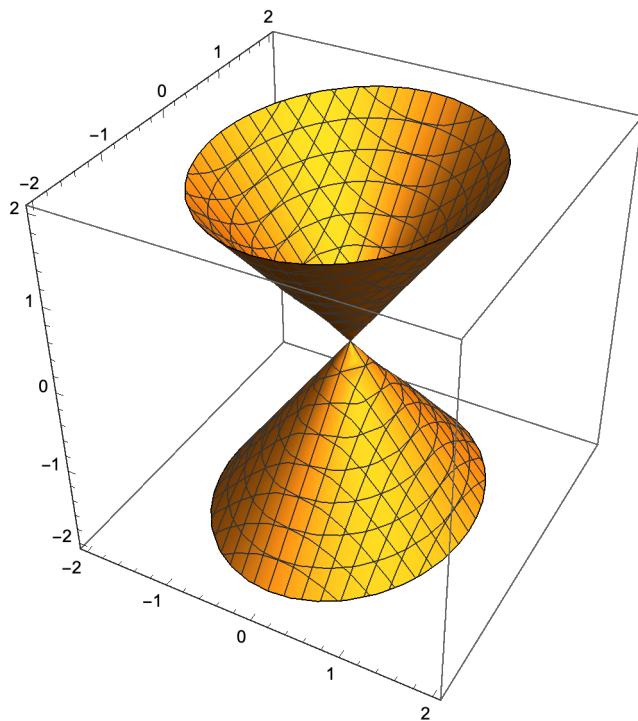
Out[167]=



In[168]:= (* Example-3. 锥面 *)

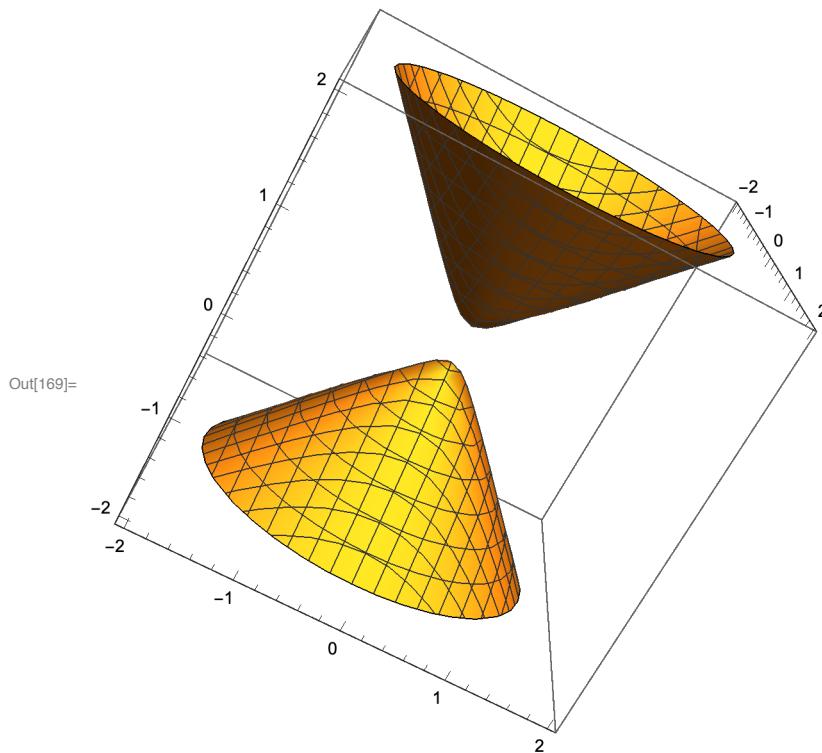
```
ContourPlot3D[1/2 x^2 + 1/3 y^2 - 1/4 z^2 == 0,
{x, -2, 2}, {y, -2, 2}, {z, -2, 2}]
```

Out[168]=



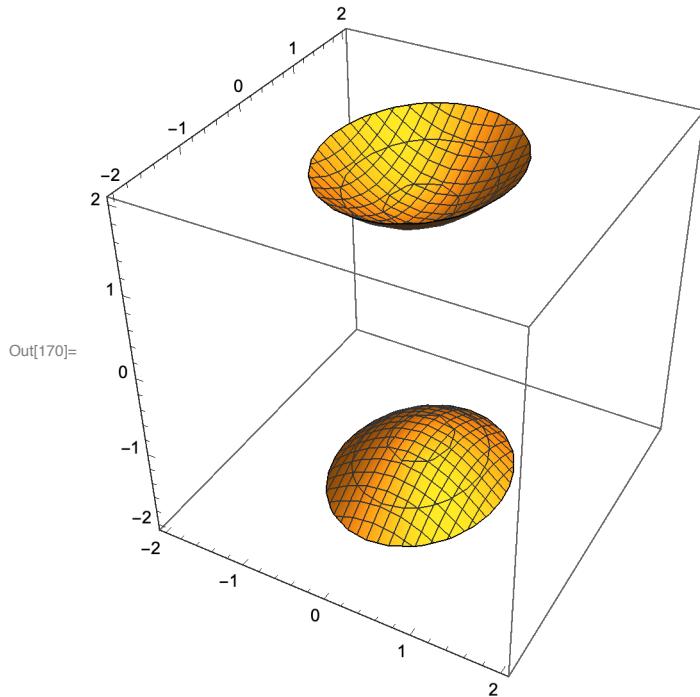
In[169]:= (* Example-4. 双叶双曲面 *)

```
ContourPlot3D[1/2 x^2 + 1/3 y^2 - 1/4 z^2 == -1/100,
{x, -2, 2}, {y, -2, 2}, {z, -2, 2}]
```



In[170]:= (* Example-5. 双叶双曲面 *)

```
ContourPlot3D[1/2 x^2 + 1/3 y^2 - 1/4 z^2 == -1/2,
{x, -2, 2}, {y, -2, 2}, {z, -2, 2}]
```

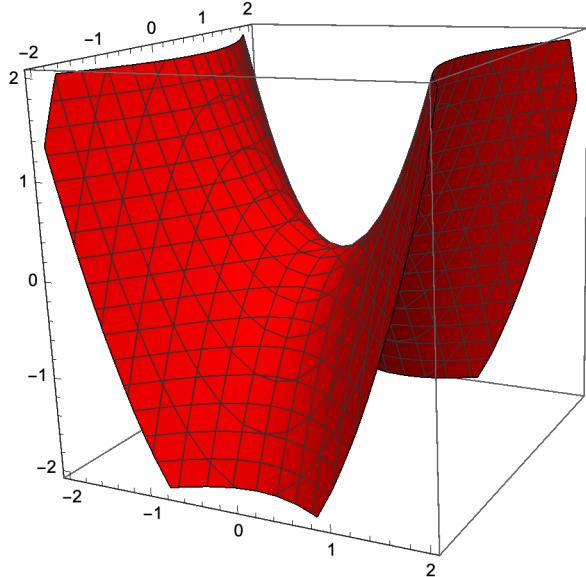


In[171]:= (*一个特征值为零, 另两个不为零*)

(* Example-1. 双曲抛物面 *)

```
ContourPlot3D[1/2 x^2 - 1/3 y^2 - 1/2 z == 0,
{x, -2, 2}, {y, -2, 2}, {z, -2, 2}, ContourStyle -> {Red}]
```

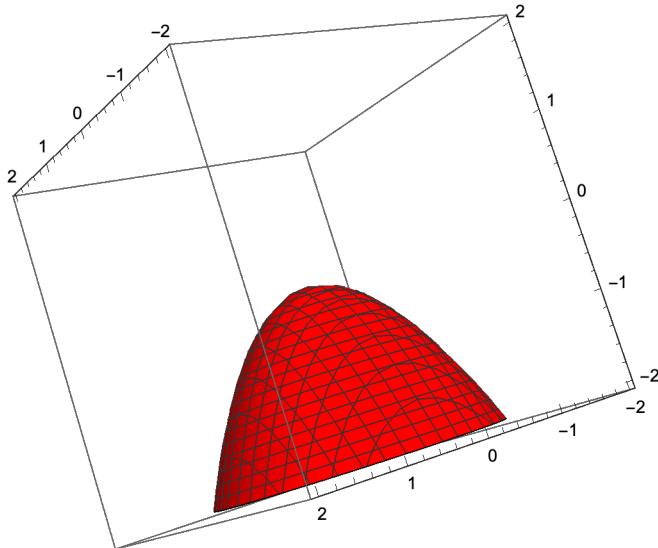
Out[171]=



In[172]:= (* Example-2. 椭圆抛物面 *)

```
ContourPlot3D[1/2 x^2 + 1/3 y^2 + 1/2 z == 0,
{x, -2, 2}, {y, -2, 2}, {z, -2, 2}, ContourStyle -> {Red}]
```

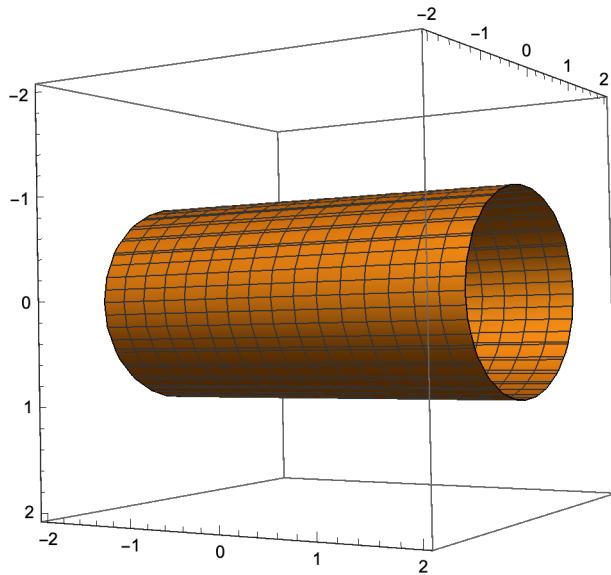
Out[172]=



(* Example-3. 椭圆柱面 *)

```
ContourPlot3D[1/2 x^2 + 1/3 y^2 - 1/2 == 0,  
{x, -2, 2}, {y, -2, 2}, {z, -2, 2}]
```

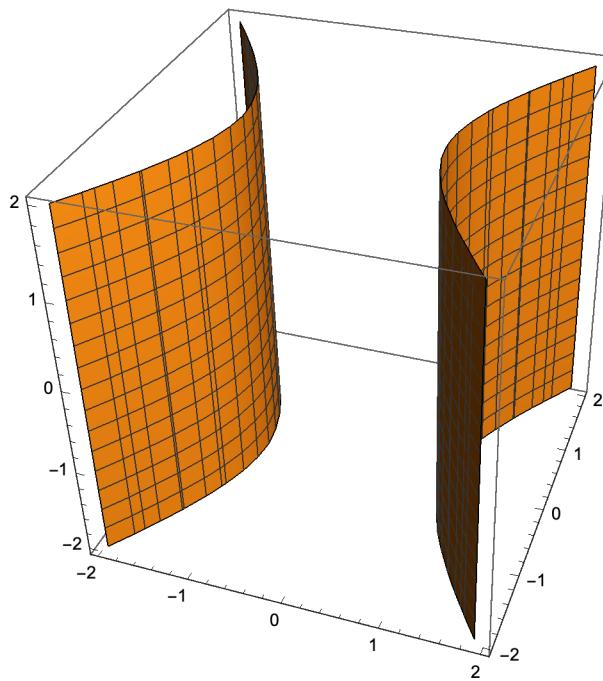
Out[173]=



(* Example-4. 双曲柱面 *)

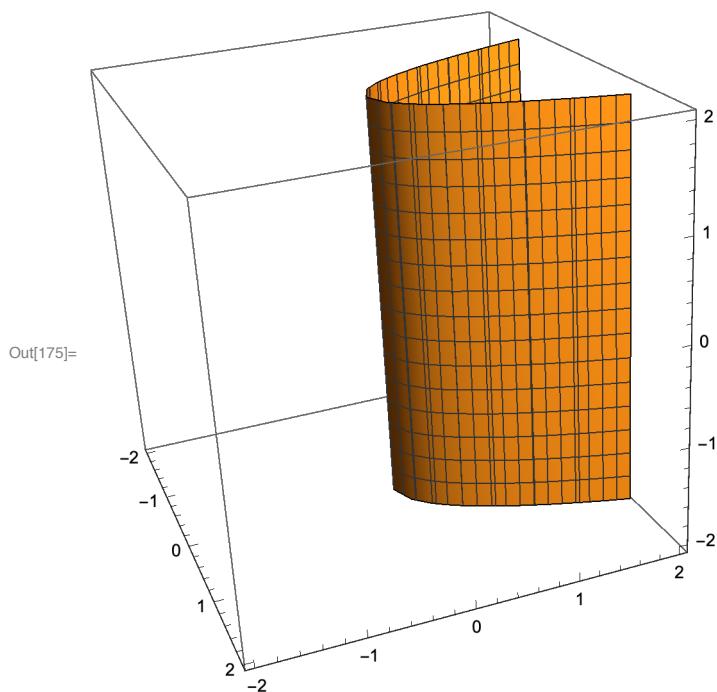
```
ContourPlot3D[1/2 x^2 - 1/3 y^2 - 1/2 == 0,  
{x, -2, 2}, {y, -2, 2}, {z, -2, 2}]
```

Out[174]=



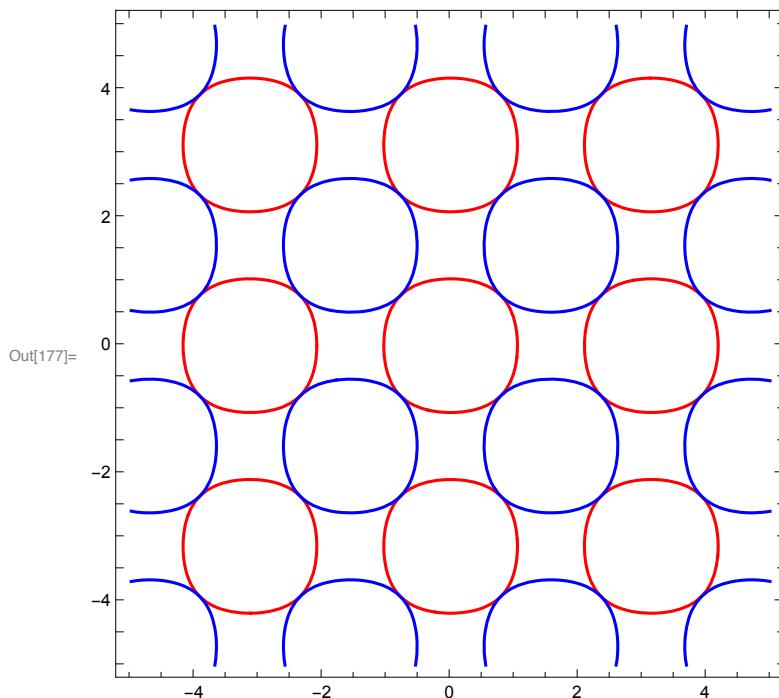
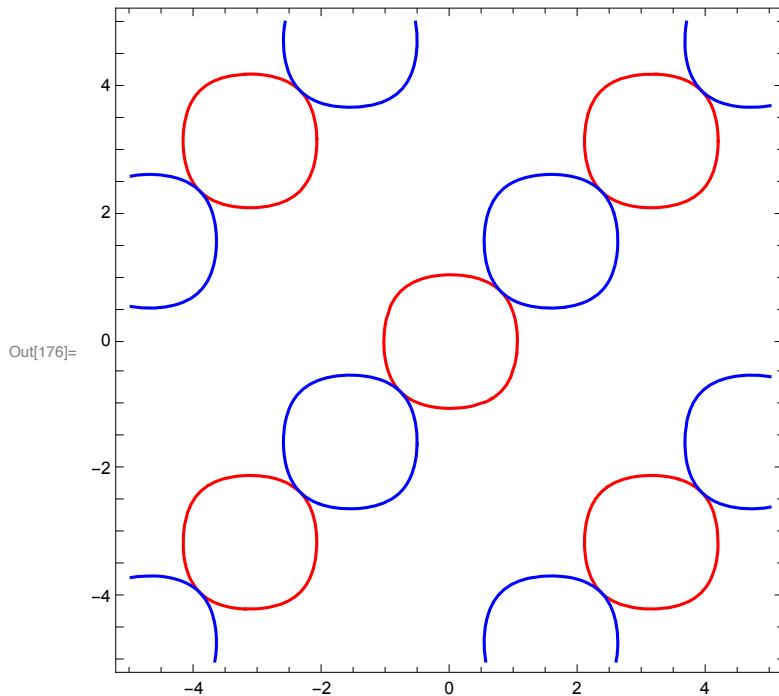
(* Example-5. 抛物柱面 *)

```
ContourPlot3D[1/2 x^2 - 1/3 y == 0, {x, -2, 2}, {y, -2, 2}, {z, -2, 2}]
```



In[176]:= (*代数曲线近似超越曲线之例*)

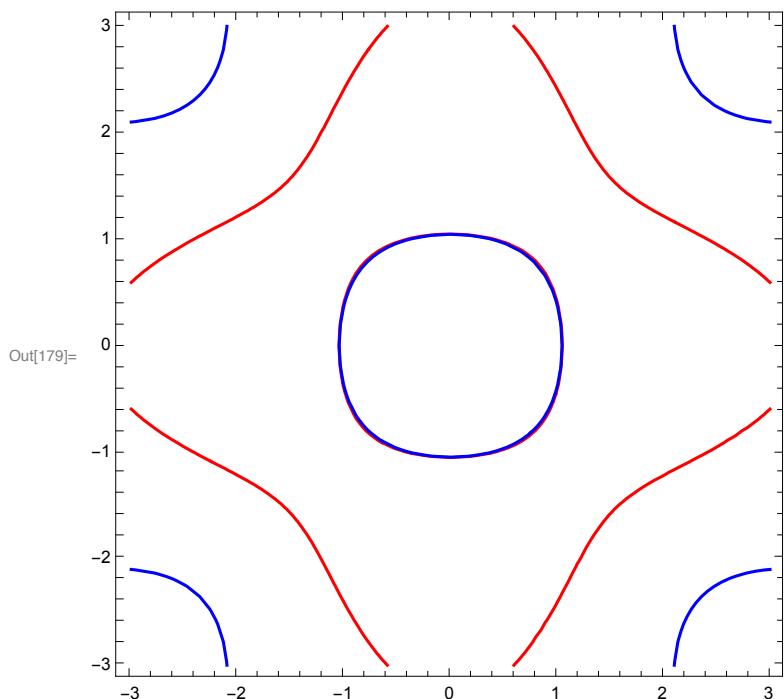
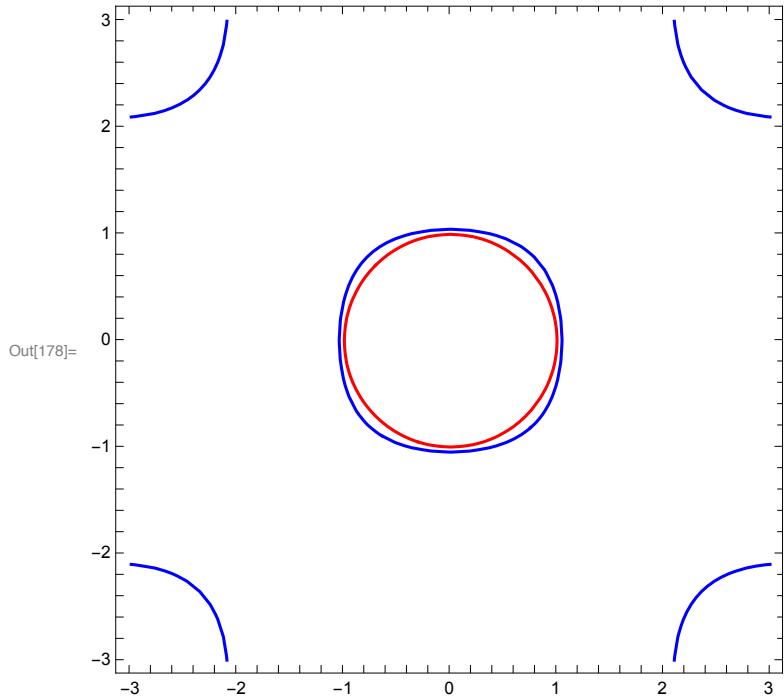
```
ContourPlot[{Cos[x] Cos[y] == 1/2, Sin[x] Sin[y] == 1/2},  
{x, -5, 5}, {y, -5, 5}, ContourStyle -> {Red, Blue}]  
ContourPlot[{Abs[Cos[x] Cos[y]] == 1/2, Abs[Sin[x] Sin[y]] == 1/2},  
{x, -5, 5}, {y, -5, 5}, ContourStyle -> {Red, Blue}]
```

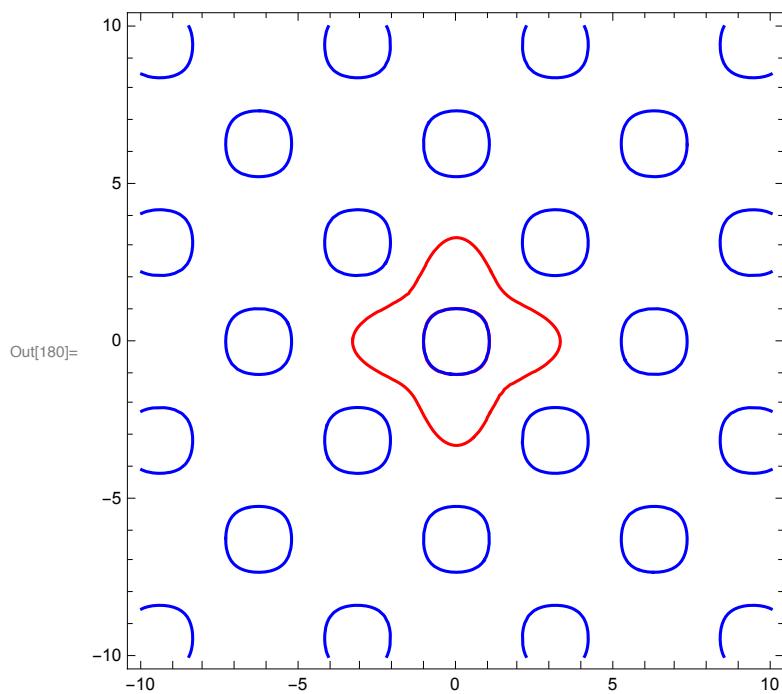


```
In[178]:= ContourPlot[\{1 - x^2/2 - y^2/2 == 1/2, Cos[x] Cos[y] == 1/2\},
{x, -3, 3}, {y, -3, 3}, ContourStyle -> {Red, Blue}]

ContourPlot[\{1 - x^2/2 + x^4/24 - y^2/2 + x^2 y^2/4 + y^4/24 == 1/2, Cos[x] Cos[y] == 1/2\},
{x, -3, 3}, {y, -3, 3}, ContourStyle -> {Red, Blue}]

ContourPlot[\{1 - x^2/2 + x^4/24 - y^2/2 + x^2 y^2/4 + y^4/24 == 1/2, Cos[x] Cos[y] == 1/2\},
{x, -10, 10}, {y, -10, 10}, ContourStyle -> {Red, Blue}]
```





```
In[181]:= ContourPlot[{x y == 1/2, Sin[x] Sin[y] == 1/2},  
{x, -2, 2}, {y, -2, 2}, ContourStyle -> {Red, Blue}]  
ContourPlot[{x y == 1/2, Sin[x] Sin[y] == 1/2},  
{x, -10, 10}, {y, -10, 10}, ContourStyle -> {Red, Blue}]
```

