Quadric Surfaces

Math 3335

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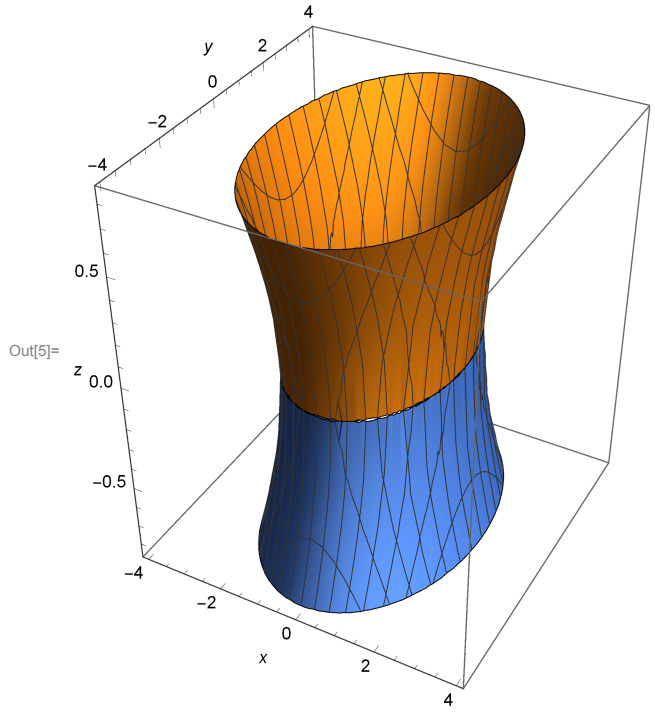
Hyperboloid of one sheet

Example: $\frac{x^2}{4}+\frac{y^2}{9}-\frac{z^2}{1}=1$

In[5]:=
```
Plot3D[{Sqrt[x^2/4+y^2/9-1], -Sqrt[x^2/4+y^2/9-1]}, {x, -4, 4},
 {y, -4, 4}, BoxRatios → {1, 1, 1.2}, ImageSize → 300, AxesLabel → {x, y, z},
 RegionFunction → Function[{x, y, z}, x^2/4+y^2/9 < 1.7]]
```

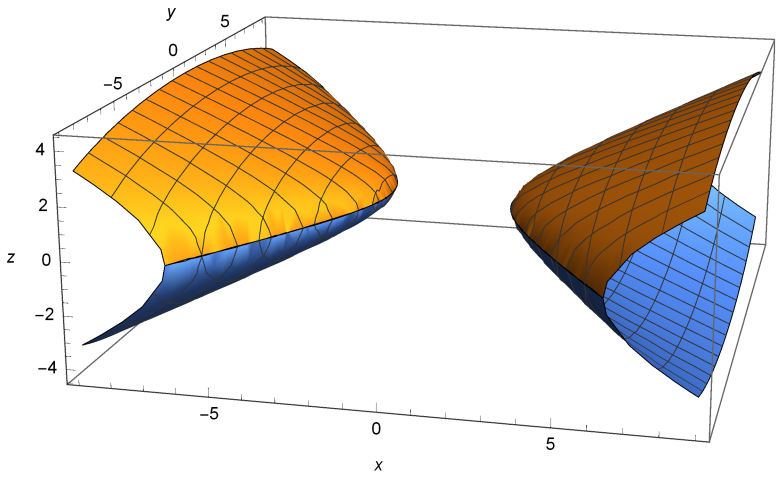
Out[5]=



Hyperboloid of two sheets

Example: $\frac{x^2}{4}-\frac{y^2}{9}-\frac{z^2}{1}=1$

```
Plot3D[{Sqrt[x^2/4 - y^2/9 - 1], -Sqrt[x^2/4 - y^2/9 - 1]},
 {x, -9, 9}, {y, -9, 9}, ImageSize → 400, AxesLabel → {x, y, z}]
```



Hyperbolic Paraboloid (aka Saddle)

Example: $\frac{x^2}{4} - \frac{y^2}{9} = \frac{z}{5}$

```
Plot3D[5 x^2/4 - 5 y^2/9, {x, -4, 4},
 {y, -4, 4}, AxesLabel → {x, y, z}, ImageSize → 400]
```