Funktionentheorie

In[1]:= $u = \frac{1 - x^2 - y^2}{1 + x^2 + y^2 - 2x}$

Out[1]= $\frac{-x^2 - y^2 + 1}{x^2 - 2x + y^2 + 1}$

In[2]:= `D[u, x] // Together`

Out[2]= $\frac{2\left(x^2 - 2x - y^2 + 1\right)}{\left(x^2 - 2x + y^2 + 1\right)^2}$

In[3]:= `D[u, {x, 2}] // Together`

Out[3]= $-\frac{4\left(x^3 - 3x^2 - 3xy^2 + 3x + 3y^2 - 1\right)}{\left(x^2 - 2x + y^2 + 1\right)^3}$

In[4]:= `D[u, {x, 2}] + D[u, {y, 2}] // Together`

Out[4]= 0

In[5]:= $u = \text{Exp}\left[x^2 - y^2\right] * \text{Cos}[2\,x\,y]$

Out[5]= $e^{x^2-y^2} \cos(2xy)$

In[6]:= `D[u, {x, 2}] // Together`

Out[6]= $2e^{x^2-y^2}\left(2x^2\cos(2xy) - 2y^2\cos(2xy) - 4xy\sin(2xy) + \cos(2xy)\right)$

In[7]:= `D[u, {x, 2}] + D[u, {y, 2}] // Together`

Out[7]= 0

■ Umkehrfunktion der Joukowski-Funktion

In[8]:=
```
Needs["Graphics`ComplexMap`"]
```

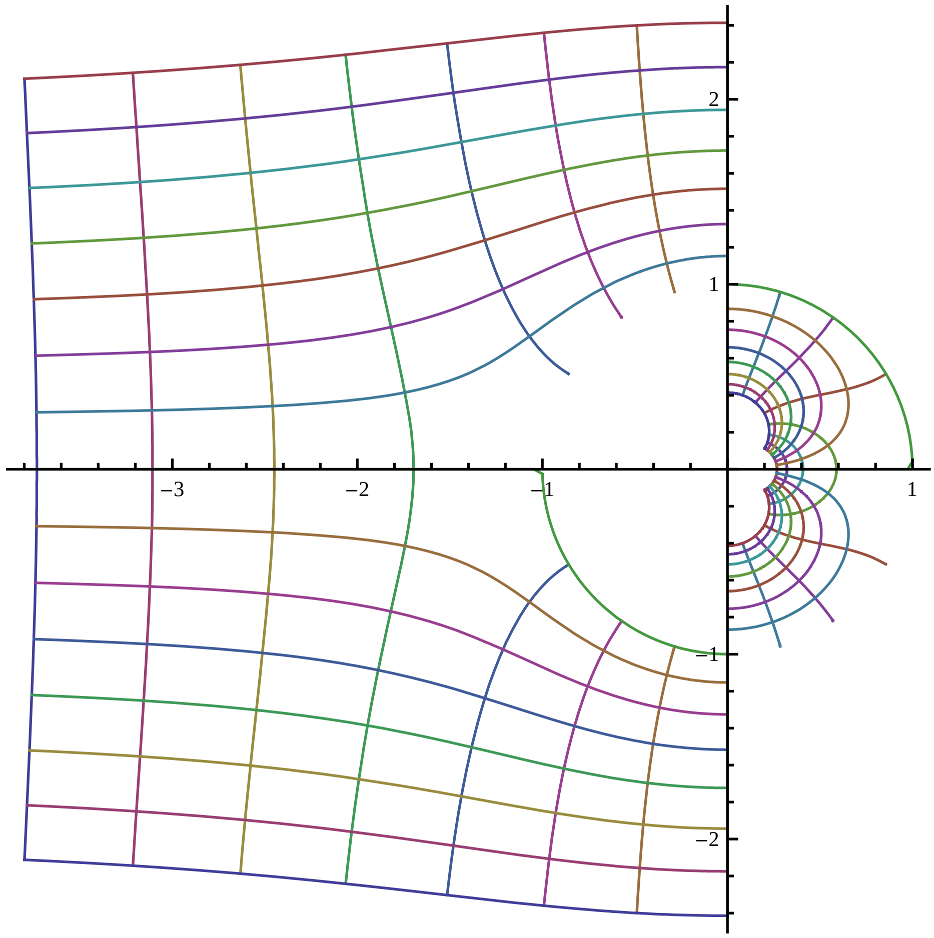
— *General::obspkg :*
Graphics`ComplexMap` is now obsolete. The legacy version being loaded may conflict with current Mathematica functionality. See the Compatibility Guide for updating information. ≫

In[9]:=
```
sol = Solve[w == 1/2 (z + 1/z), z]
```

Out[9]= $\left\{\left\{z \to w - \sqrt{w^2 - 1}\right\}, \left\{z \to \sqrt{w^2 - 1} + w\right\}\right\}$

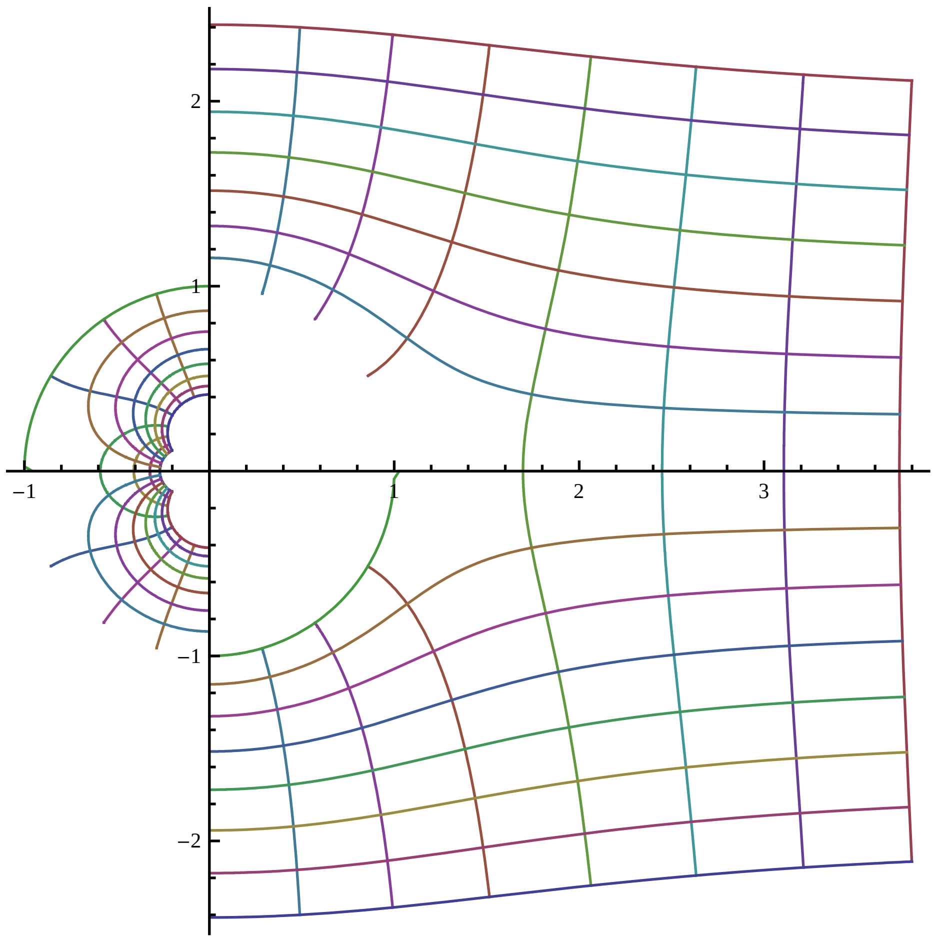
In[10]:=
```
plot1 = CartesianMap[z /. sol[[1]] /. w → # &, {-2, 2}, {-1, 1}]
```

Out[10]=



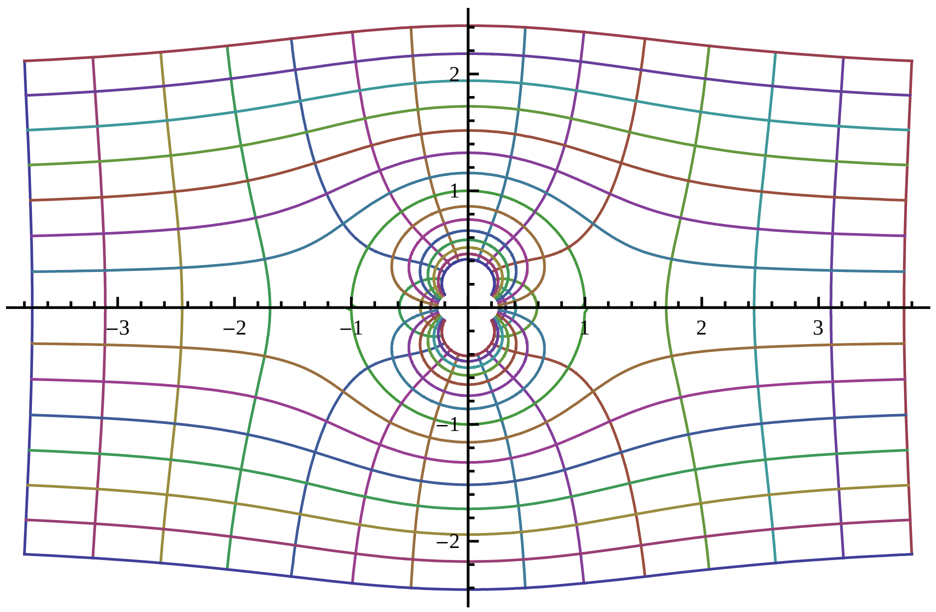
In[11]:= `plot2 = CartesianMap[z /. sol[[2]] /. w → # &, {-2, 2}, {-1, 1}]`

Out[11]=



In[12]:= `Show[plot1, plot2]`

Out[12]=



Kurvenintegrale

$\int_K (z - z0)^n \, dz$

In[13]:= $\text{int} = \int_0^{2\pi} \left((z[t] - z0)^n \, z'[t] \; /. \; \{z \to (z0 + r\, e^{i\,\#} \&)\} \right) dt$

Out[13]= 0

In[14]:= $\text{int} = \int_0^{2\pi} \left((z[t] - z0)^{-1} \, z'[t] \; /. \; \{z \to (z0 + r\, e^{i\,\#} \&)\} \right) dt$

Out[14]= $2\, i\, \pi$