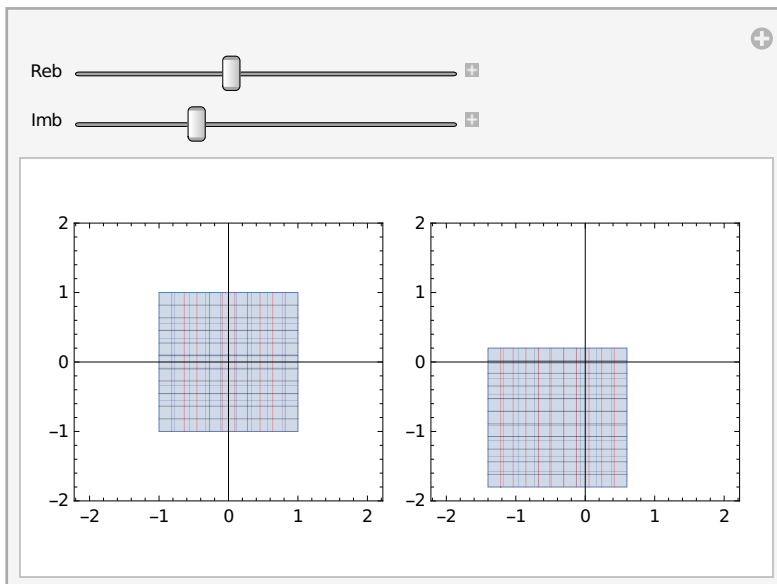


# Lineární funkce

## Posunutí pomocí $f: w = z + b$

```
In[1]:= f1[z_, b_] = z + b;  
Manipulate[  
  gr1 = ParametricPlot[ReIm[x + I y], {x, -1, 1}, {y, -1, 1},  
    PlotPoints -> 10, PlotRange -> {-2, 2}, Mesh -> 10, MeshStyle -> {Red, Black}];  
  gr2 = ParametricPlot[ReIm[f1[x + I y, Reb + I Imb]], {x, -1, 1}, {y, -1, 1},  
    PlotPoints -> 10, PlotRange -> {-2, 2}, Mesh -> 10, MeshStyle -> {Red, Black}];  
  Show[GraphicsGrid[{{gr1, gr2}}]  
    , {Reb, -2, 2, 0.4}, {Imb, -2, 2, 0.4}]
```

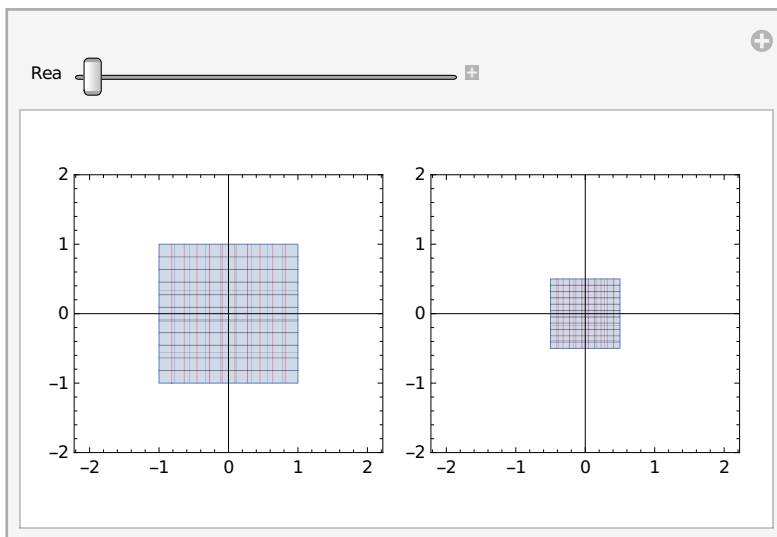
Out[2]=



## Stejnolehlost pomocí $f$ : $w = a z$ , kde $a > 0$

```
In[3]:= f2[z_, a_] = a z;  
Manipulate[  
  gr1 = ParametricPlot[ReIm[x + I y], {x, -1, 1}, {y, -1, 1},  
    PlotPoints → 10, PlotRange → {-2, 2}, Mesh → 10, MeshStyle → {Red, Black}];  
  gr2 = ParametricPlot[ReIm[f2[x + I y, Rea]], {x, -1, 1}, {y, -1, 1},  
    PlotPoints → 10, PlotRange → {-2, 2}, Mesh → 10, MeshStyle → {Red, Black}];  
  Show[GraphicsGrid[{{gr1, gr2}}]  
    , {Rea, 0.5, 2, 0.1}]
```

Out[4]=



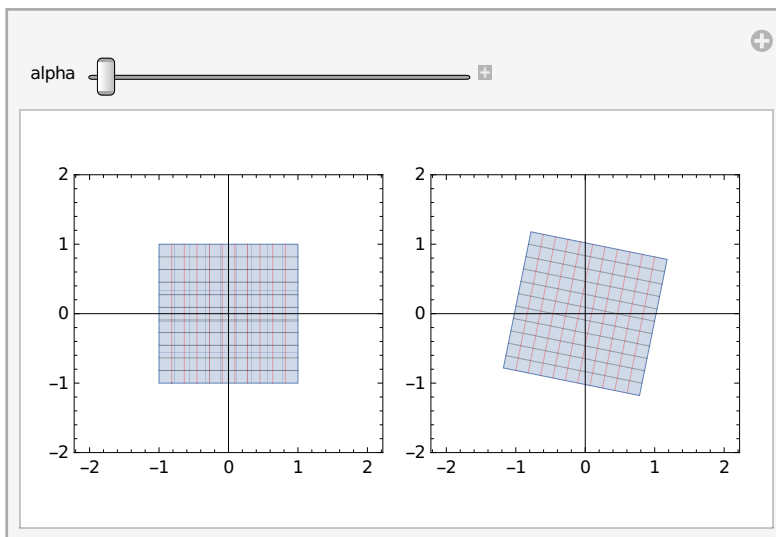
## Otočení pomocí $f: w = a z$ , kde $|a|=1$

```

In[5]:= f3[z_, a_] = a z;
Manipulate[
  gr1 = ParametricPlot[ReIm[x + I y], {x, -1, 1}, {y, -1, 1},
    PlotPoints → 10, PlotRange → {-2, 2}, Mesh → 10, MeshStyle → {Red, Black}];
  gr2 = ParametricPlot[ReIm[f3[x + I y, Exp[I alpha]]], {x, -1, 1}, {y, -1, 1},
    PlotPoints → 10, PlotRange → {-2, 2}, Mesh → 10, MeshStyle → {Red, Black}];
  Show[GraphicsGrid[{{gr1, gr2}}]
, {alpha, -0.2, 3, 0.1}]

```

Out[6]=

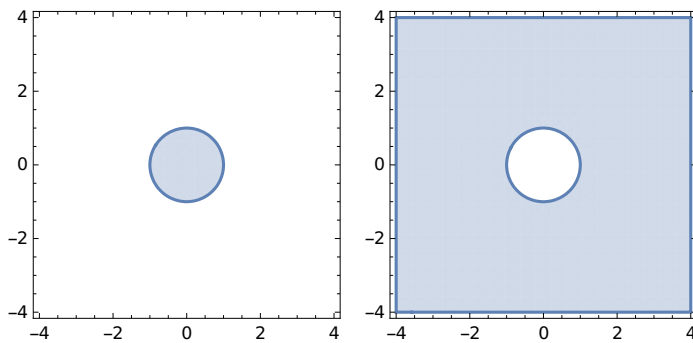


# Kruhová inverze

**f:  $w = 1/\bar{z}$**

```
f[z_] = 1/Conjugate[z]
gr1 = RegionPlot[Abs[x + I y] < 1, {x, -4, 4}, {y, -4, 4}];
gr2 = RegionPlot[Abs[f[u + I v]] < 1, {u, -4, 4}, {v, -4, 4}];
Show[GraphicsGrid[{{gr1, gr2}}]
```

$\frac{1}{\text{Conjugate}[z]}$

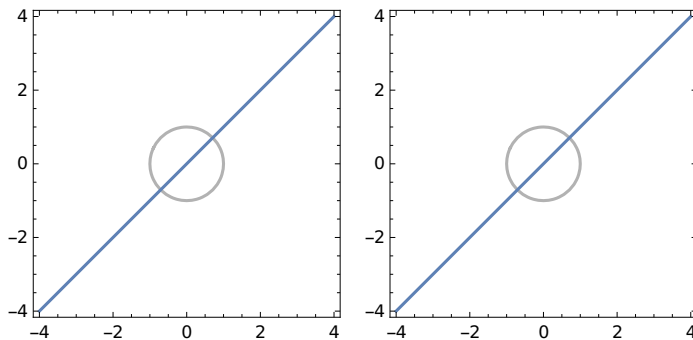


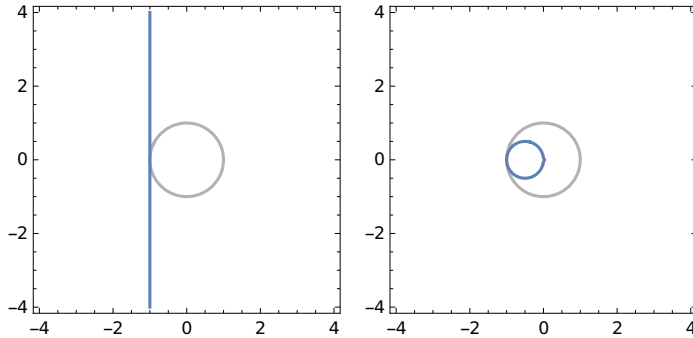
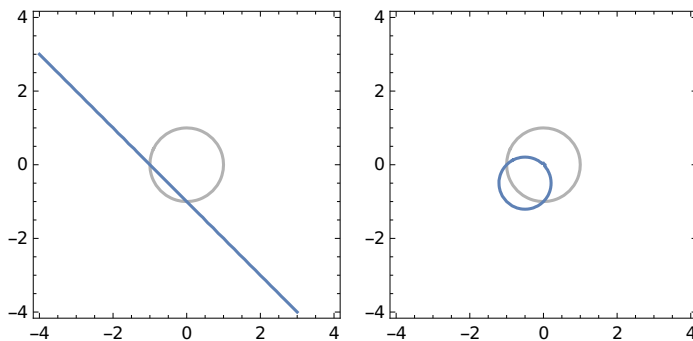
$f[z_] = 1/\text{Conjugate}[z]$

gr0 =

```
ContourPlot[Abs[x + I y] == 1, {x, -4, 4}, {y, -4, 4}, ContourStyle -> GrayLevel[0.7]];
gr1 = ContourPlot[Abs[x + I y - 1] == Abs[x + I y - I], {x, -4, 4}, {y, -4, 4}];
gr2 = ContourPlot[Abs[f[u + I v] - 1] == Abs[f[u + I v] - I], {u, -4, 4}, {v, -4, 4}];
Show[GraphicsGrid[{{Show[gr0, gr1], Show[gr0, gr2}}]]]
```

$\frac{1}{\text{Conjugate}[z]}$



$f[z_] = 1/\text{Conjugate}[z]$ 
 $gr0 =$ 
 $\text{ContourPlot}[\text{Abs}[x + I y] == 1, \{x, -4, 4\}, \{y, -4, 4\}, \text{ContourStyle} \rightarrow \text{GrayLevel}[0.7]];$ 
 $gr1 = \text{ContourPlot}[\text{Abs}[x + I y + 2] == \text{Abs}[x + I y], \{x, -4, 4\}, \{y, -4, 4\}];$ 
 $gr2 = \text{ContourPlot}[\text{Abs}[f[u + I v] + 2] == \text{Abs}[f[u + I v]], \{u, -4, 4\}, \{v, -4, 4\}];$ 
 $\text{Show}[\text{GraphicsGrid}[\{\{\text{Show}[gr0, gr1], \text{Show}[gr0, gr2]\}\}]]$ 
 $\frac{1}{\text{Conjugate}[z]}$ 

 $f[z_] = 1/\text{Conjugate}[z]$ 
 $gr0 =$ 
 $\text{ContourPlot}[\text{Abs}[x + I y] == 1, \{x, -4, 4\}, \{y, -4, 4\}, \text{ContourStyle} \rightarrow \text{GrayLevel}[0.7]];$ 
 $gr1 = \text{ContourPlot}[\text{Abs}[x + I y] == \text{Abs}[x + I y + 1 + I], \{x, -4, 4\}, \{y, -4, 4\}];$ 
 $gr2 = \text{ContourPlot}[\text{Abs}[f[u + I v]] == \text{Abs}[f[u + I v] + 1 + I], \{u, -4, 4\}, \{v, -4, 4\}];$ 
 $\text{Show}[\text{GraphicsGrid}[\{\{\text{Show}[gr0, gr1], \text{Show}[gr0, gr2]\}\}]]$ 
 $\frac{1}{\text{Conjugate}[z]}$ 


# Lineární lomená funkce

$$f : w = (a z + b) / (c z + d)$$

```

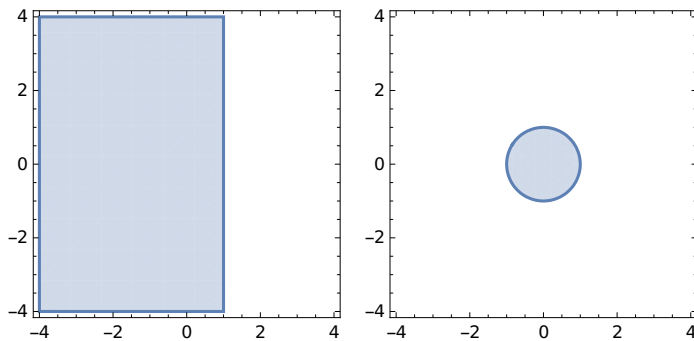
f[z_] = z / (z - 2)
vv = Solve[f[z] == w, z];
g[w_] = vv[[1, 1, 2]]
FullSimplify[{f[g[z]], g[f[z]]}]
gr1 = RegionPlot[Re[x + I y] < 1, {x, -4, 4}, {y, -4, 4}];
gr2 = RegionPlot[Re[g[u + I v]] < 1, {u, -4, 4}, {v, -4, 4}];
Show[GraphicsGrid[{{gr1, gr2}}]]

$$\frac{z}{-2 + z}$$


$$\frac{2 w}{-1 + w}$$

{z, z}

```



```

In[7]:= f[z_] = (z + 1) / (z - 1)
vv = Solve[f[z] == w, z];
g[w_] = vv[[1, 1, 2]]
Manipulate[
  gr1 = ParametricPlot[ReIm[x + I y], {x, -1 + a, a}, {y, b, 1 + b},
    PlotPoints -> 10, PlotRange -> {-2, 2}, Mesh -> 10, MeshStyle -> {Red, Black}];
  gr2 = ParametricPlot[ReIm[g[u + I v]], {u, -1 + a, a}, {v, b, 1 + b},
    PlotPoints -> 10, PlotRange -> {-2, 2}, Mesh -> 10, MeshStyle -> {Red, Black}];
  gr3 = ParametricPlot[ReIm[Exp[I t]], {t, -π, π}, PlotPoints -> 10, PlotStyle -> Red];
  Show[GraphicsGrid[{{gr1, Show[gr2, gr3]}},
    {a, 0, 2, 0.1}, {b, 0, 1, 0.1}]]

```

Out[7]=  $\frac{1+z}{-1+z}$

Out[9]=  $\frac{1+w}{-1+w}$

