Natural logarithm in complex plane

Let's present the natural logarithm in the complex plane on a 2D and 3D graph.

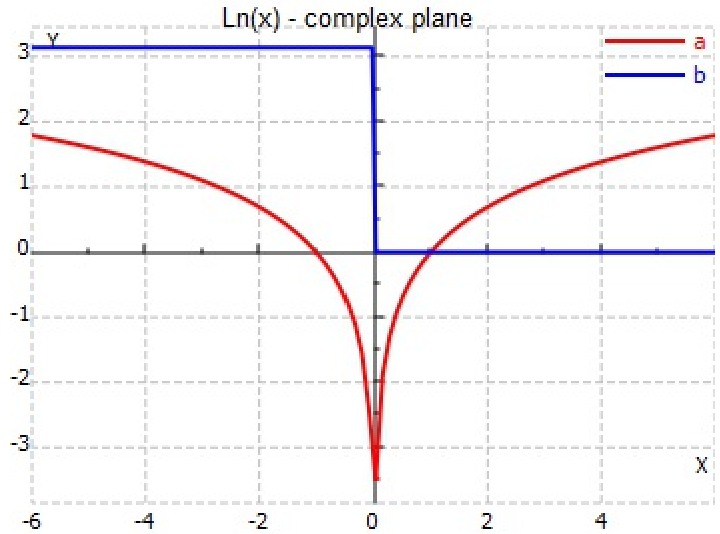
First we will draw the 2D graph, the real part and the imaginary part will be two separated plots presented on the same graph. Argument x will take values in at a interval of [-6 , 6] with two hundred samples.

$$a := \text{complexcurve2dre}\left(\ln(x), x, -6, 6, 200\right)$$

Extract the real part of the complex values and prepare them for plotting

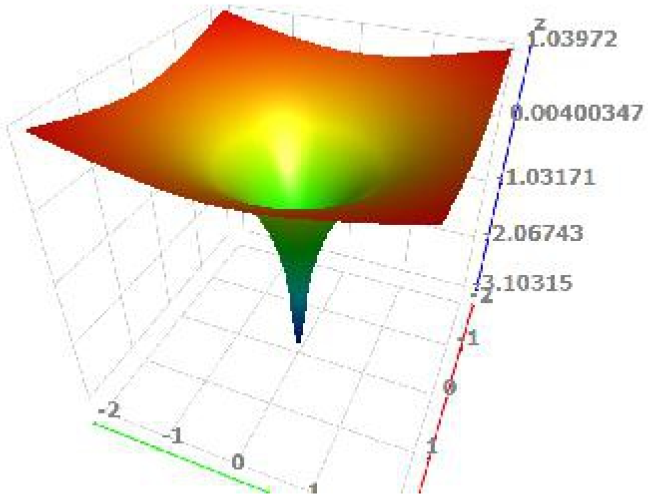
$$b := \text{complexcurve2dimg}\left(\ln(x), x, -6, 6, 200\right)$$

Extract the imaginary part of the complex values and prepare them for plotting



Now, we will present the natural logarithm in the complex plane values via a 3D graph.

$$c := \text{surface3d}\left(\text{Re}\left(\ln(x + 1i \cdot y)\right), x, -2, 2, 50, y, -2, 2, 50\right)$$

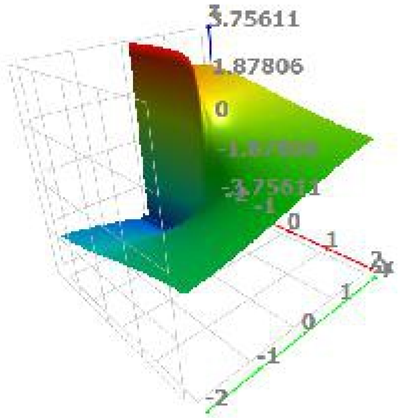


Real part of ln(z) over the complex z-plane

x-axis is in a interval of [-2 , 2] with 50 samples

y-axis is in a interval of [-2 , 2] with 50 samples

$$d := \text{surface3d}\left(\text{Im}\left(\ln(x + 1i \cdot y)\right), x, -2, 2, 50, y, -2, 2, 50\right)$$



Imaginary part of ln(z) over the complex z-plane

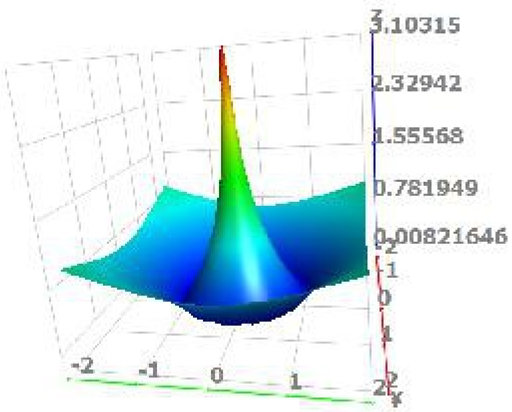
x-axis is in a interval of [-2 , 2] with 50 samples

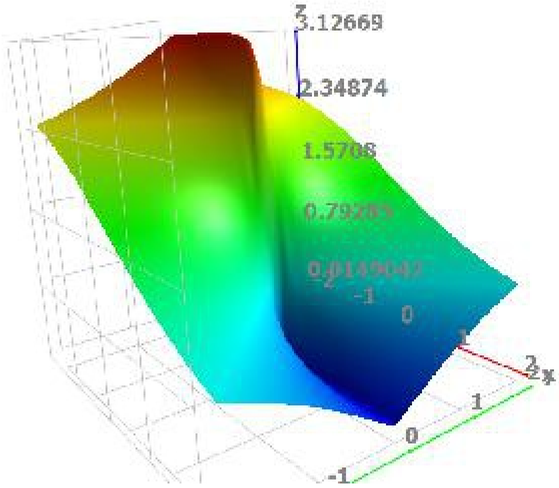
y-axis is in a interval of [-2 , 2] with 50 samples

On the next two 3D-graphs we will draw the absolute value of both the real and imaginary parts respectively.

$$e := \text{surface3d}\left(\left|\text{Re}\left(\ln(x + 1i \cdot y)\right)\right|, x, -2, 2, 50, y, -2, 2, 50\right)$$

$$f := \text{surface3d}\left(\left|\text{Im}\left(\ln(x + 1i \cdot y)\right)\right|, x, -2, 2, 50, y, -2, 2, 50\right)$$





Absolute value of the real part of ln(z) over the complex z-plane

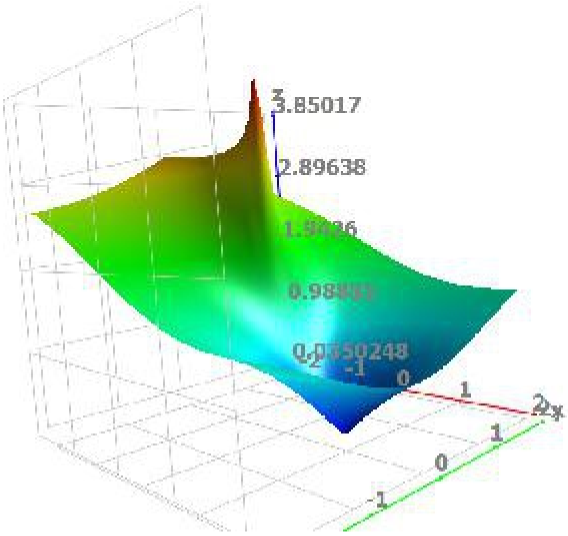
Absolute value of the imaginary part of ln(z) over the complex z-plane

x-axis is in a interval of [-2 , 2] with 50 samples

y-axis is in a interval of [-2 , 2] with 50 samples

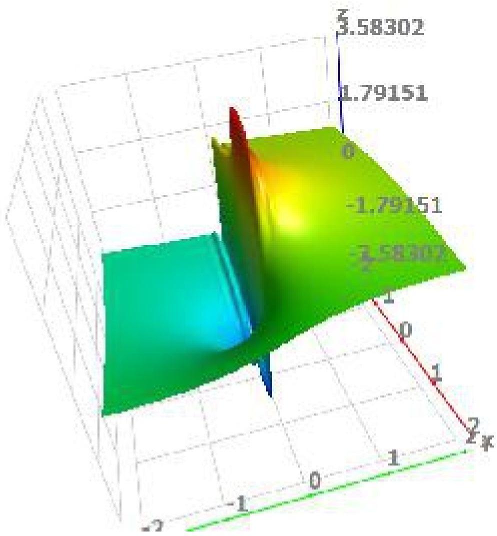
On the final graphs we will draw the absolute value and argument of the natural logarithm in the complex plane.

$$gr := \mathrm{surface3d}\left(\left|\ln(x + 1i \cdot y)\right|, x, -2, 2, 50, y, -2, 2, 50\right)$$



Absolute value of ln(z) over the complex z-plane

$$h := \mathrm{surface3d}\left(\Theta\left(\ln(x + 1i \cdot y)\right), x, -2, 2, 50, y, -2, 2, 50\right)$$



Argument of ln(z) over the complex z-plane