

Find the domain of the function

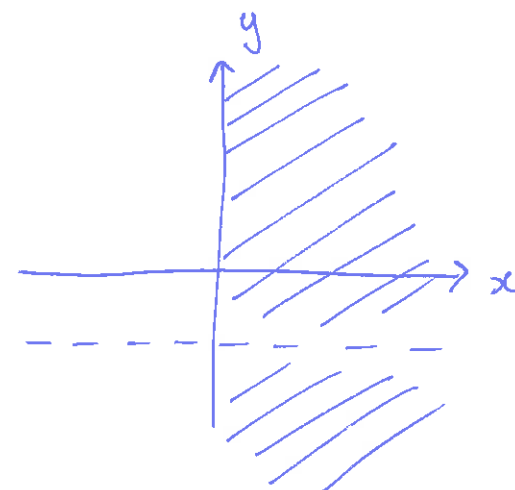
$$g(x, y) = \frac{\sqrt{x}}{1+y}$$

For \sqrt{x} to be defined, we require $x \geq 0$.

For $\frac{1}{1+y}$ to be defined, we require $1+y \neq 0$ i.e. $y \neq -1$.

$$\text{domain} = \{(x, y) \in \mathbb{R}^2 \mid x \geq 0 \text{ and } y \neq -1\}$$

dotted line
means it is
not in the
domain



Example: Find the domain of the function

$$F: D(F) \rightarrow \mathbb{R}^2$$

$$F(x, y, z, w) = \left(\frac{x+z}{y^2+1}, \frac{z}{\ln(x+y)} \right).$$

\ln
 \mathbb{R}^4

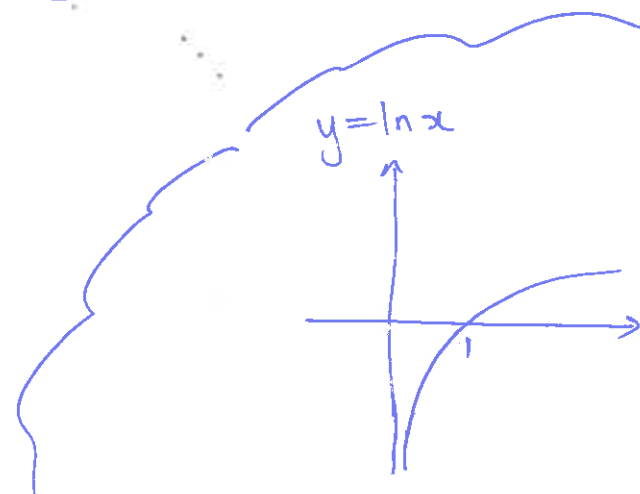
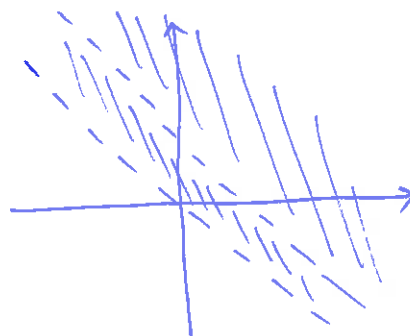
For $\frac{1}{y^2+1}$ to be defined, we require $y^2+1 \neq 0$ — this is always true because $y^2+1 \geq 1$.

For $\frac{1}{\ln(x+y)}$ to be defined, we require $\ln(x+y) \neq 0$

$$x+y \neq 1 \quad y \neq 1-x$$

For $\ln(x+y)$ to be defined, we require $x+y > 0$
 $y > -x$

domain is $\{(x, y) \in \mathbb{R}^2 \mid y > -x \text{ and } y \neq 1-x\}$



Example: Describe the graph of $k(x, y) = x - y$.

The graph is:

$$Z = x - y$$
$$0 = x - y - z$$

This is a plane through the origin
with normal $\vec{i} - \vec{j} - \vec{k}$.