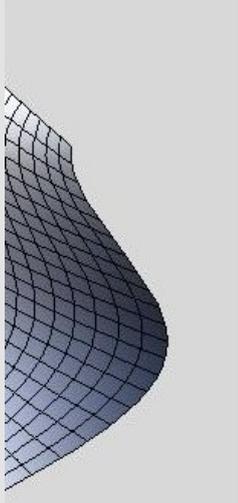


Definitionsbereich einer Funktion $f(x, y)$: Aufgaben





Bestimmen Sie den Definitionsbereich und Wertebereich der folgenden Funktionen von zwei Variablen. Zeichnen Sie den Definitionsbereich

Aufgabe 18: $f(x, y) = \sqrt{1 - x^2} + \sqrt{1 - y^2}$

$$g(x, y) = \sqrt{1 - x^2} + \sqrt{1 - y^2} + 1$$

Aufgabe 19: $f(x, y) = \sqrt{x^2 - 4} + \sqrt{4 - y^2}$

Aufgabe 20: $f(x, y) = \sqrt{4 - x^2 - y^2}$

Aufgabe 21: $f(x, y) = \sqrt{9 - x^2 - y^2} + 3$

Aufgabe 22: $f(x, y) = \sqrt{xy - 1}$

Aufgabe 23: $f(x, y) = \sqrt{x^2 + y}$

Aufgabe 24: $f(x, y) = x^2 + y^2 + \frac{1}{x^2 + y^2}$

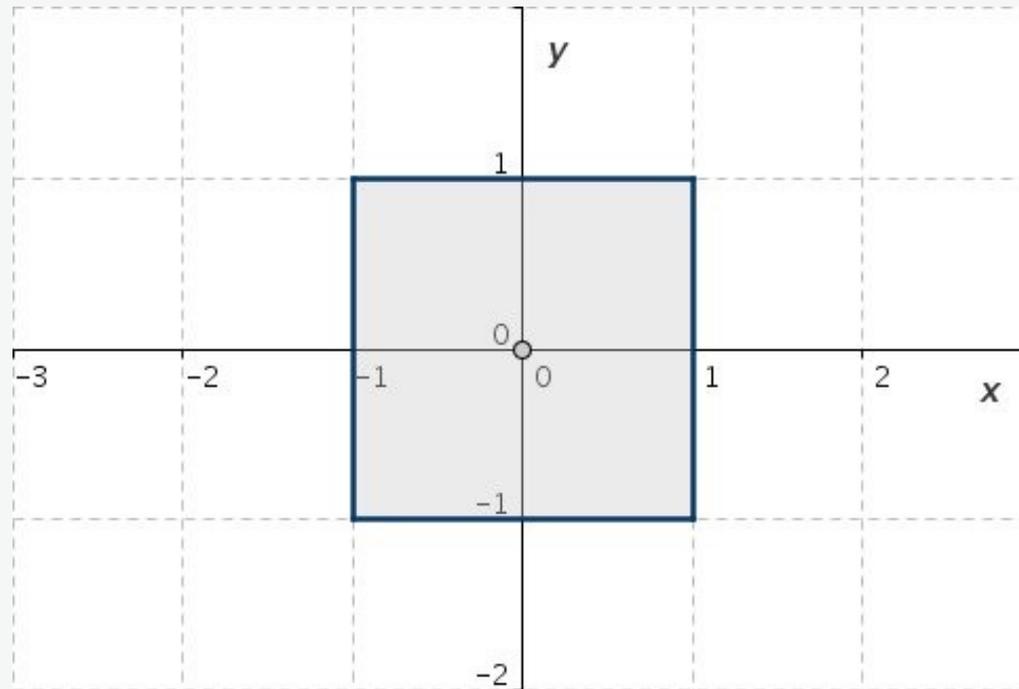


Abb. L18-1: Definitionsbereich der Funktion $f(x, y)$

$$f(x, y) = \sqrt{1 - x^2} + \sqrt{1 - y^2}$$

$$D(f) = \{ (x, y) \in \mathbb{R}^2 \mid -1 \leq x \leq 1, \quad -1 \leq y \leq 1 \}$$

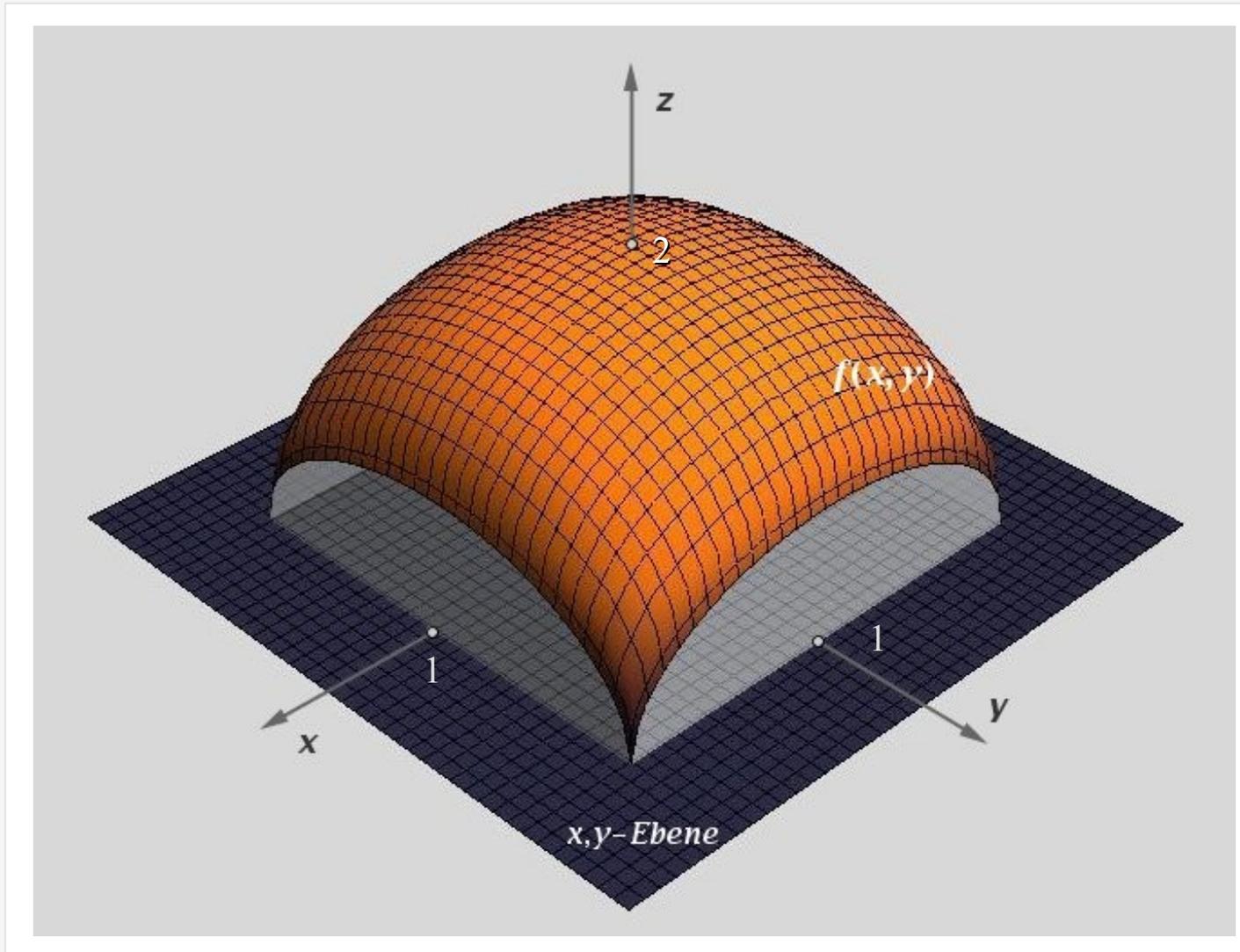


Abb. L18-2: Graphische Darstellung der Funktion $f(x, y)$

$$f(x, y) = \sqrt{1 - x^2} + \sqrt{1 - y^2}, \quad W(f) = [0, 2]$$

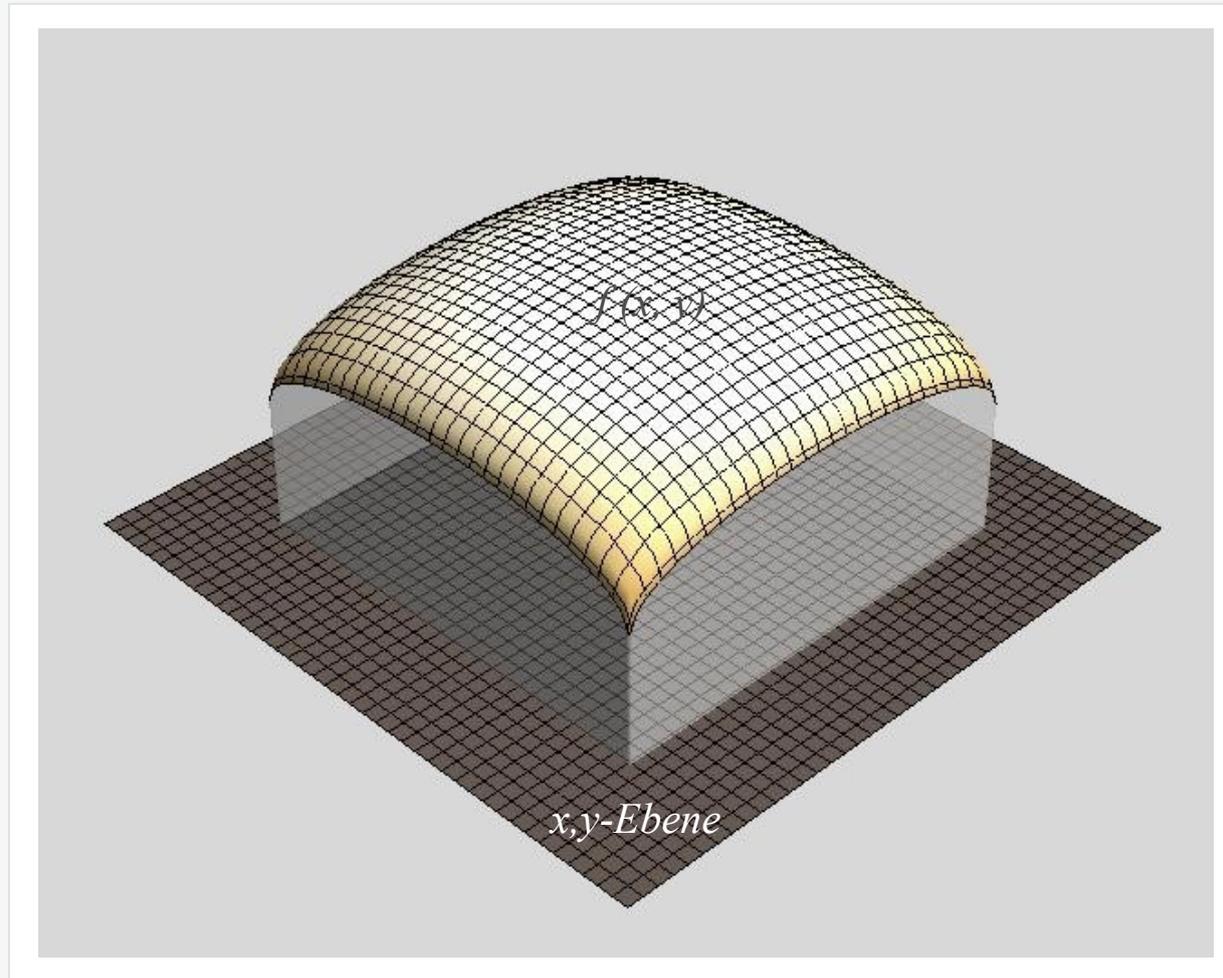


Abb. L18-3: Graphische Darstellung der Funktion $g(x, y) = f(x, y) + 1$

$$g(x, y) = \sqrt{1 - x^2} + \sqrt{1 - y^2} + 1$$

$$D(g) = \{ (x, y) \in \mathbb{R}^2 \mid -1 \leq x \leq 1, -1 \leq y \leq 1 \}, \quad W(f) = [1, 3]$$

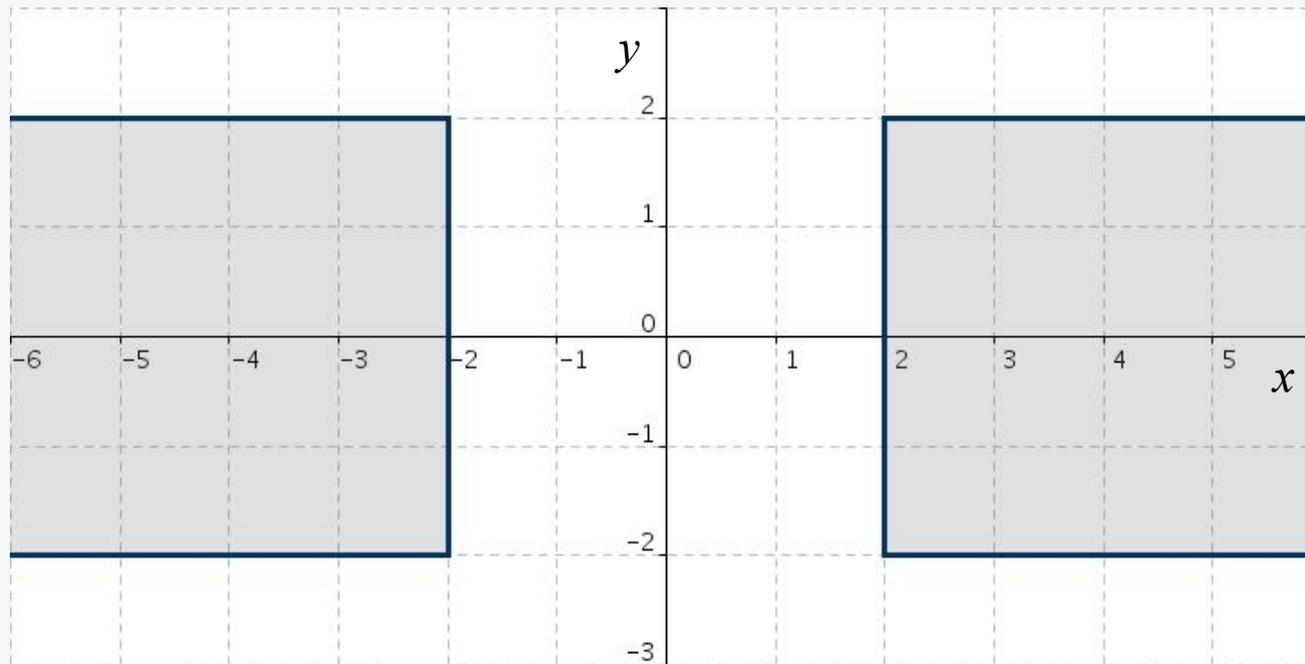


Abb. L19-1: Definitionsbereich der Funktion $f(x, y)$

$$f(x, y) = \sqrt{x^2 - 4} + \sqrt{4 - y^2}$$

$$x^2 - 4 \geq 0 \quad \Leftrightarrow \quad x^2 \geq 4 \quad \Leftrightarrow \quad x \in I = (-\infty, -2] \cup [2, \infty)$$

$$4 - y^2 \geq 0 \quad \Leftrightarrow \quad y^2 \leq 4 \quad \Leftrightarrow \quad |y| \leq 2 \quad \Leftrightarrow \quad y \in I = [-2, 2]$$

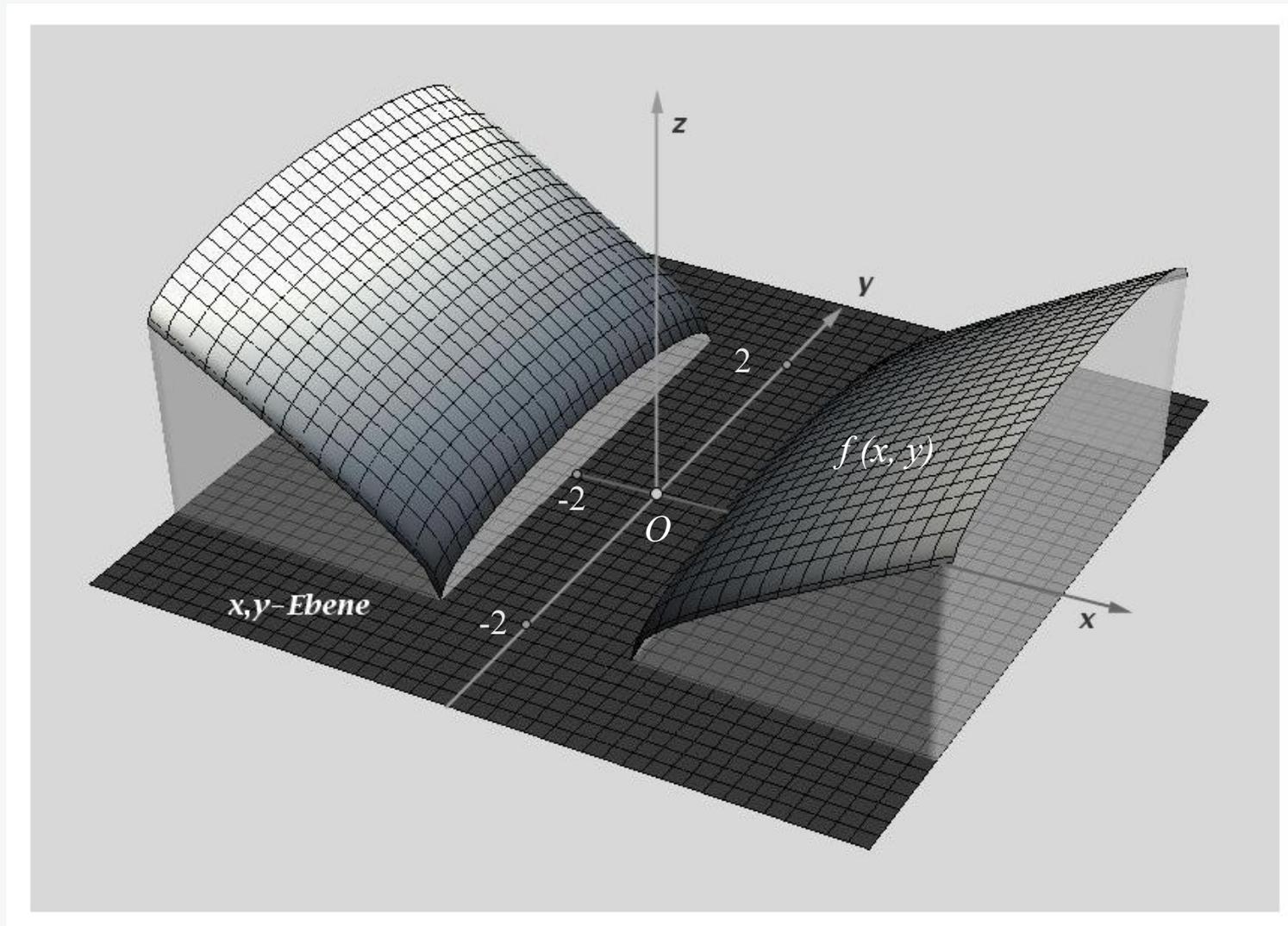


Abb. L19-2: Graphische Darstellung der Funktion $f(x, y)$

$$W = [0, \infty)$$

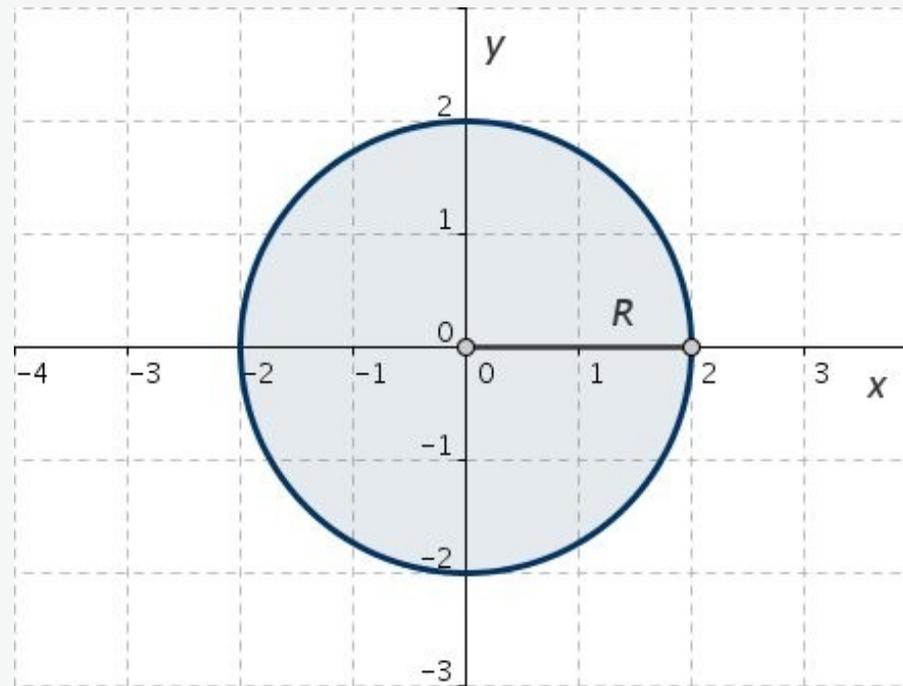


Abb. L20-1: Definitionsbereich der Funktion $f(x, y)$

$$f(x, y) = \sqrt{4 - x^2 - y^2}$$

$$4 - x^2 - y^2 \geq 0 \Leftrightarrow x^2 + y^2 \leq 4$$

$$D(f) = \{ (x, y) \in \mathbb{R}^2 \mid x^2 + y^2 \leq 4 \}$$

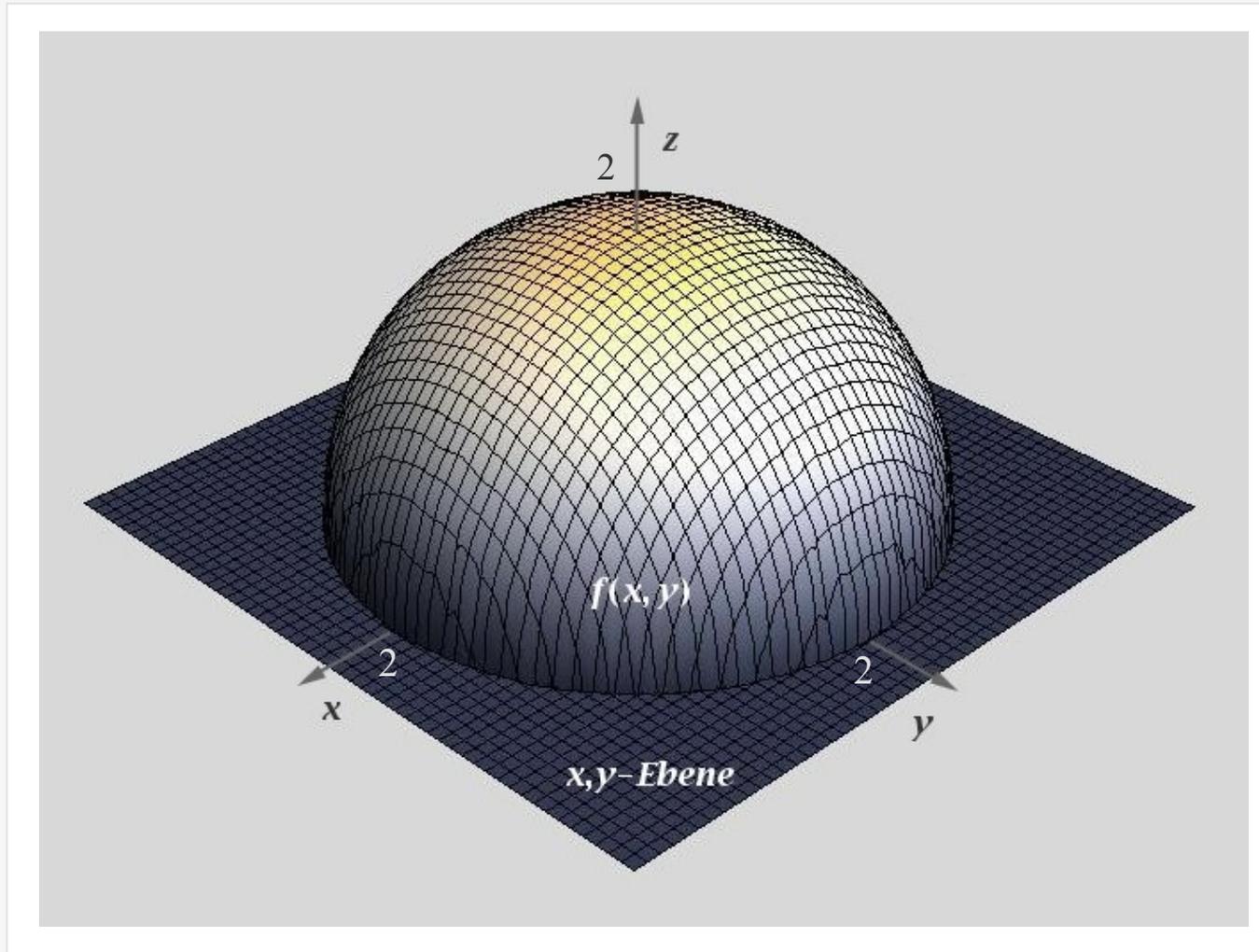


Abb. L20-2: Graphische Darstellung der Funktion $f(x, y)$

$$W = [0, 2]$$

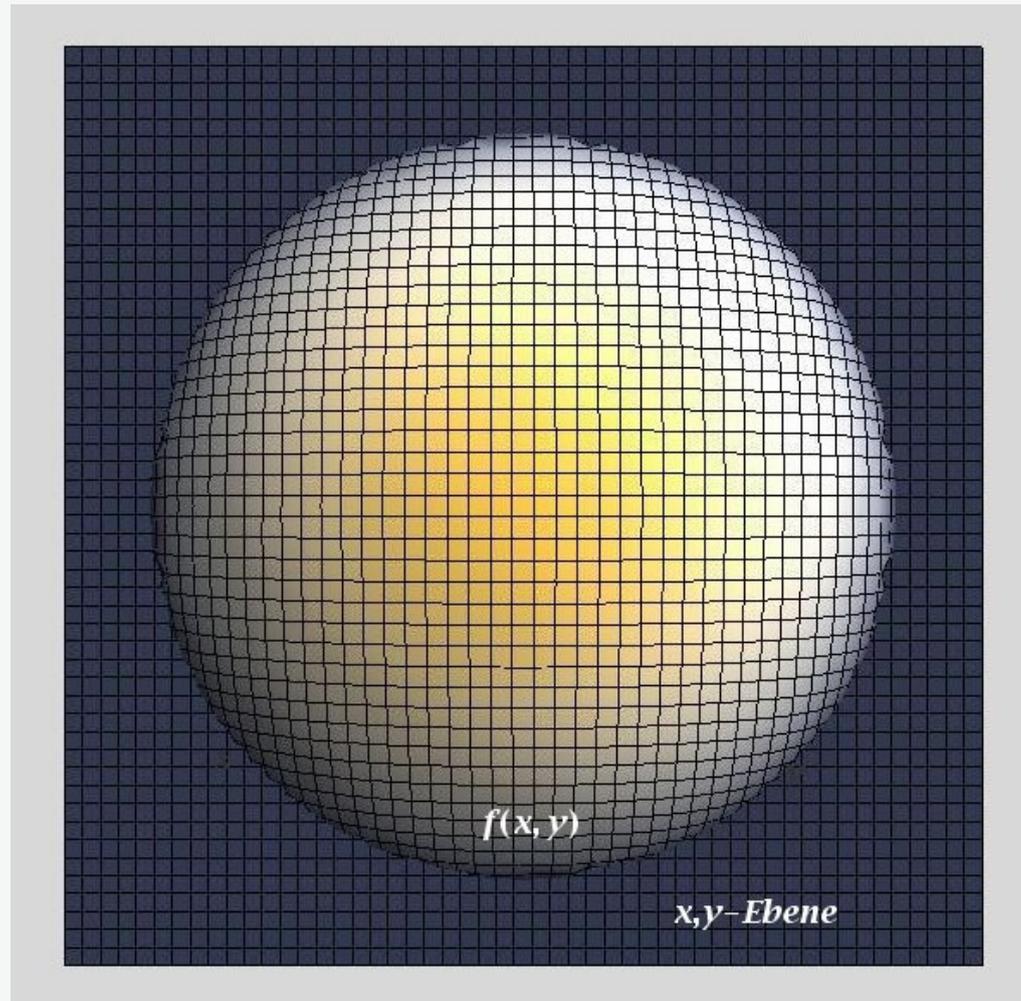


Abb. L20-3: Graphische Darstellung der Funktion $f(x, y)$

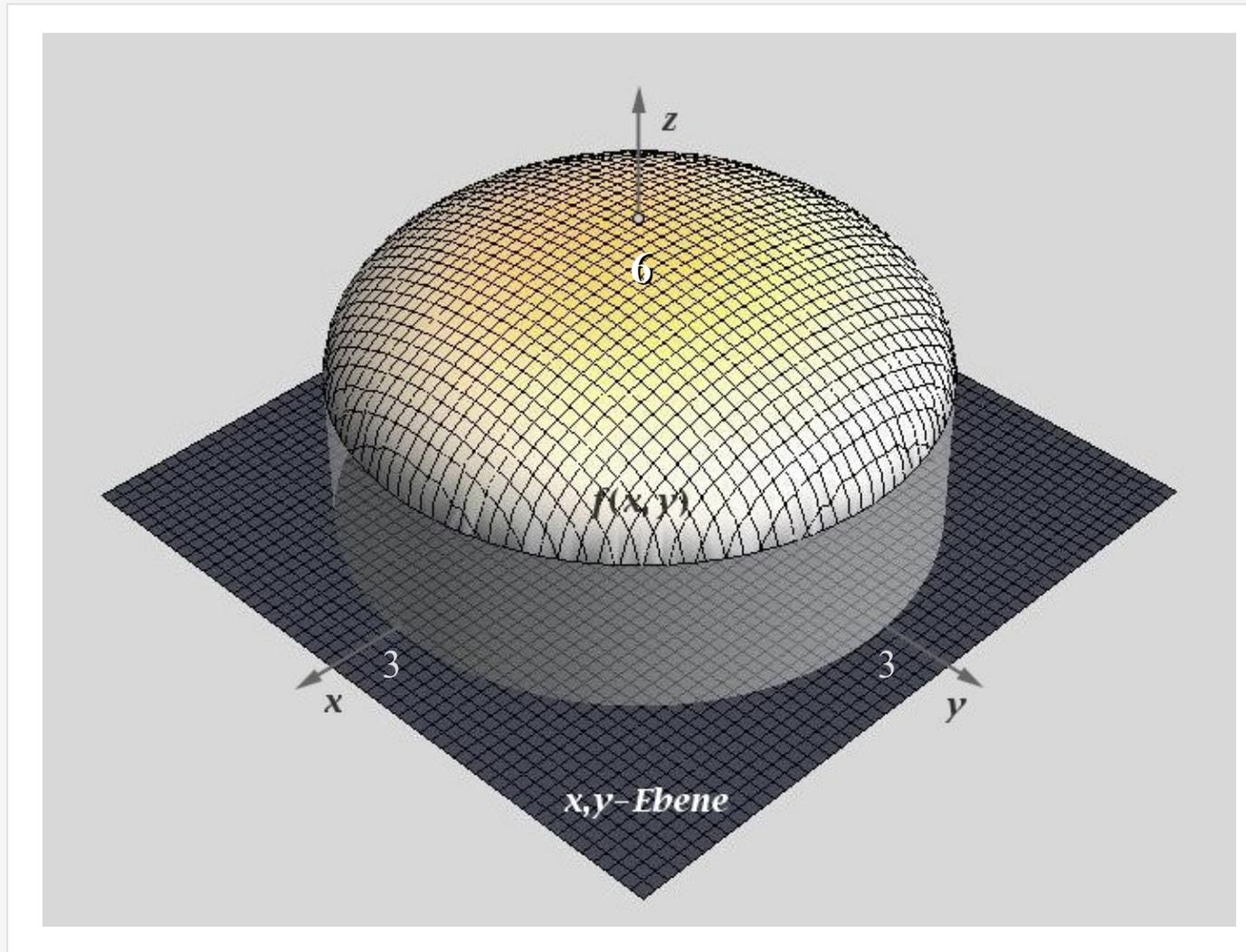


Abb. L21-1: Graphische Darstellung der Funktion $f(x, y)$

$$f(x, y) = \sqrt{9 - x^2 - y^2} + 3, \quad D(f) = \{ (x, y) \in \mathbb{R}^2 \mid x^2 + y^2 \leq 9 \}$$

$$W = [3, 6]$$

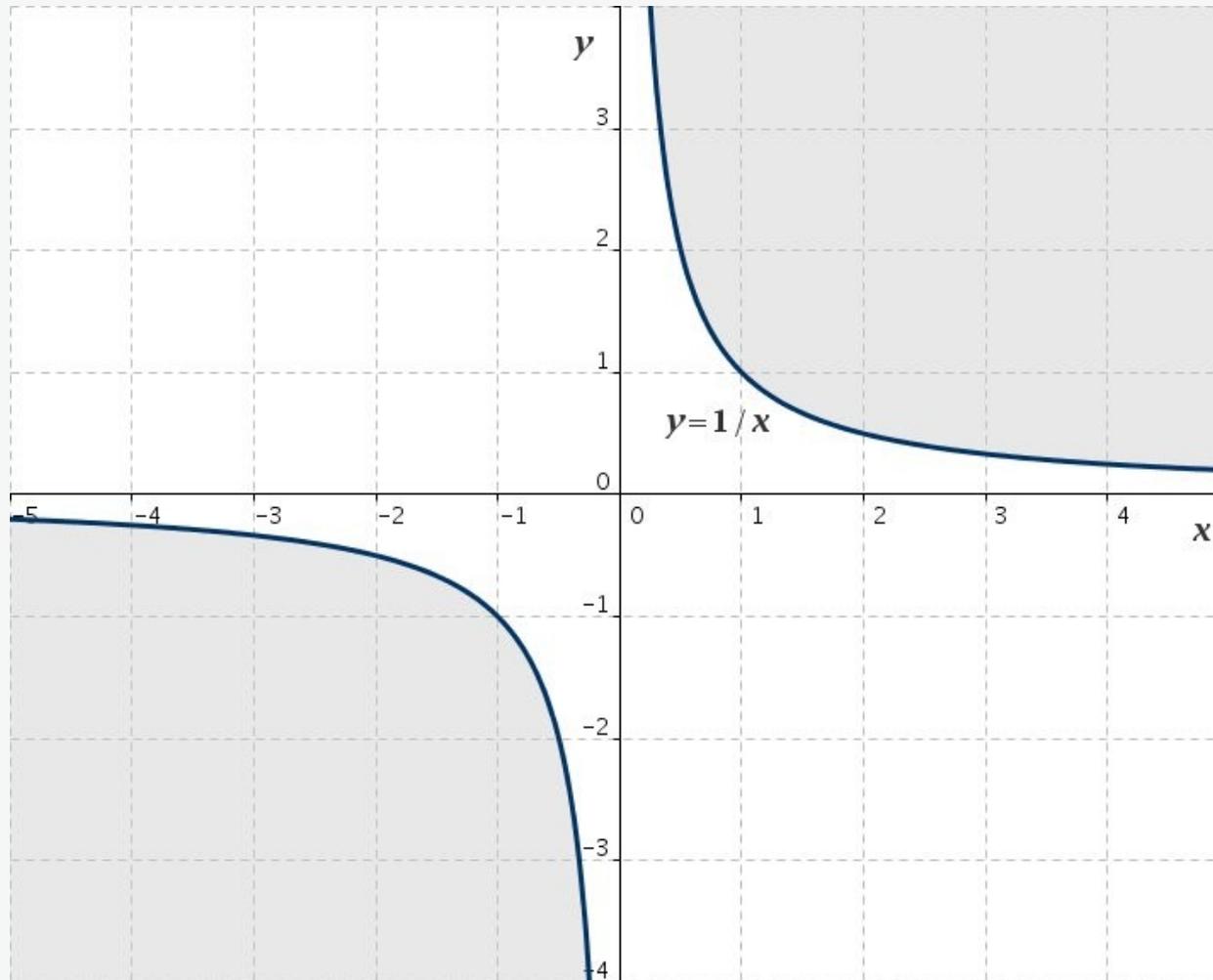


Abb. L22-1: Definitionsbereich der Funktion $f(x, y)$

$$f(x, y) = \sqrt{xy - 1}$$

$$D(f) = \left\{ (x, y) \in \mathbb{R}^2 \mid x > 0, y \geq \frac{1}{x} \cup x < 0, y \leq \frac{1}{x} \right\}$$

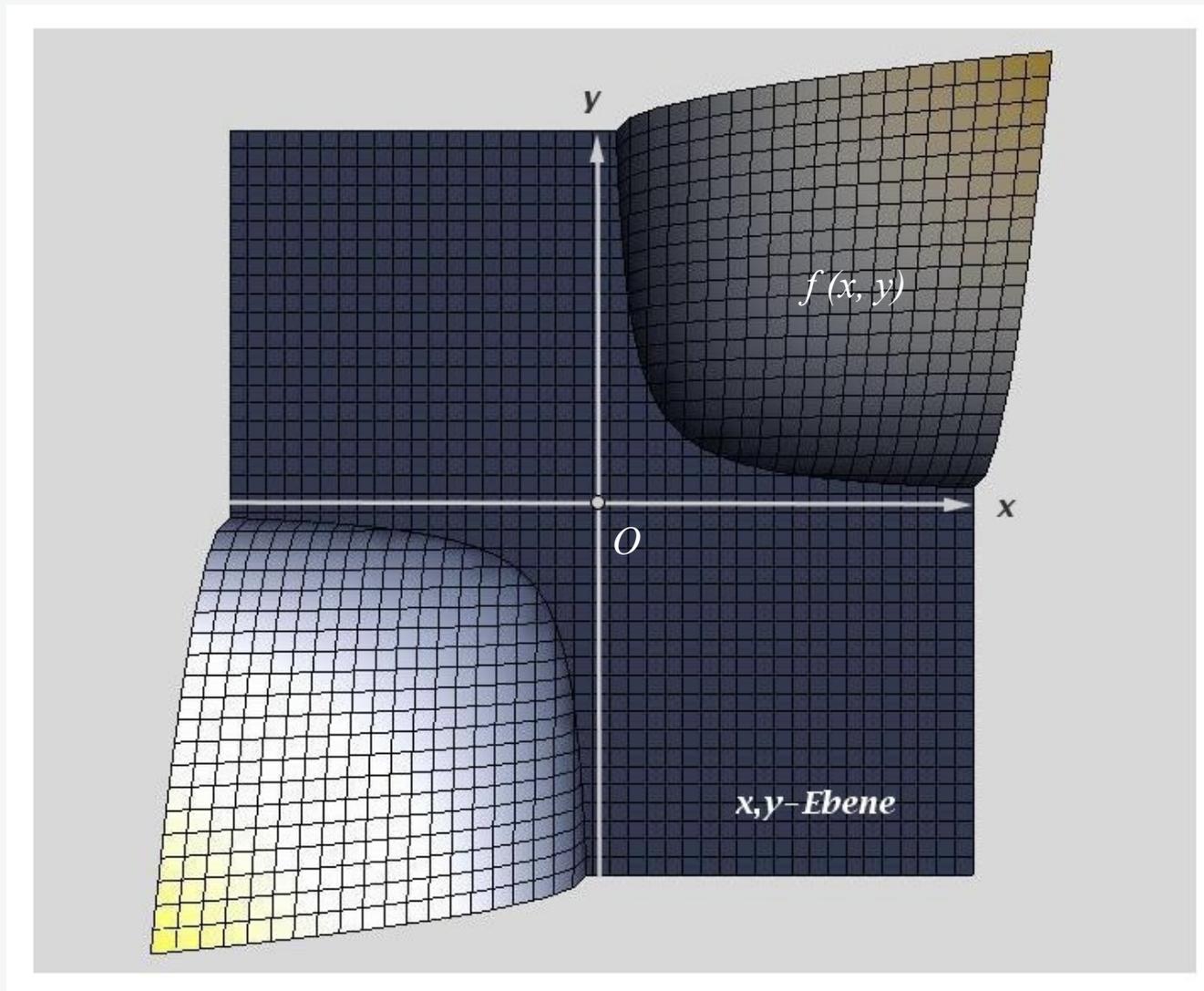


Abb. L22-2: Graphische Darstellung der Funktion $f(x, y)$

$$f(x, y) = \sqrt{xy - 1}, \quad W = [0, \infty)$$

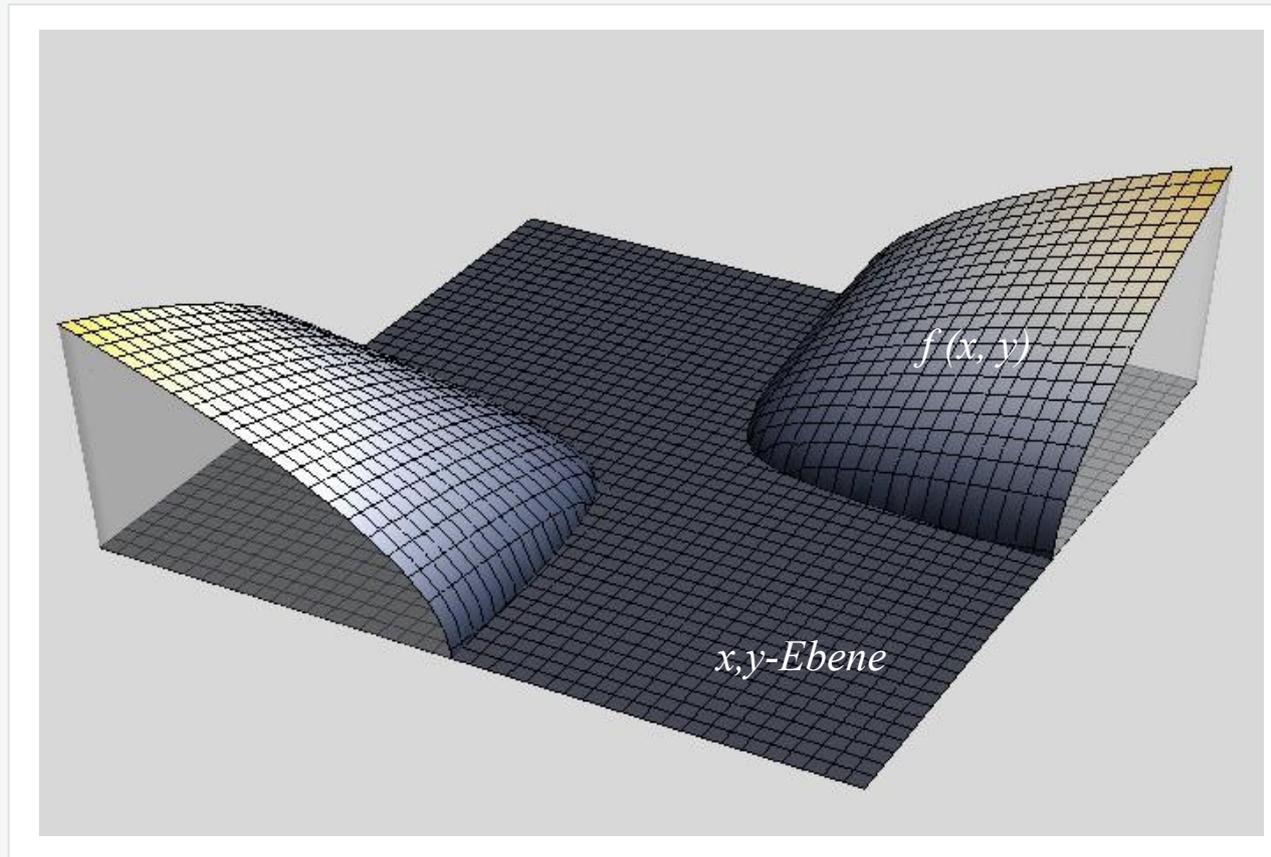


Abb. L22-3: Graphische Darstellung der Funktion $f(x, y)$

$$f(x, y) = \sqrt{xy - 1}$$

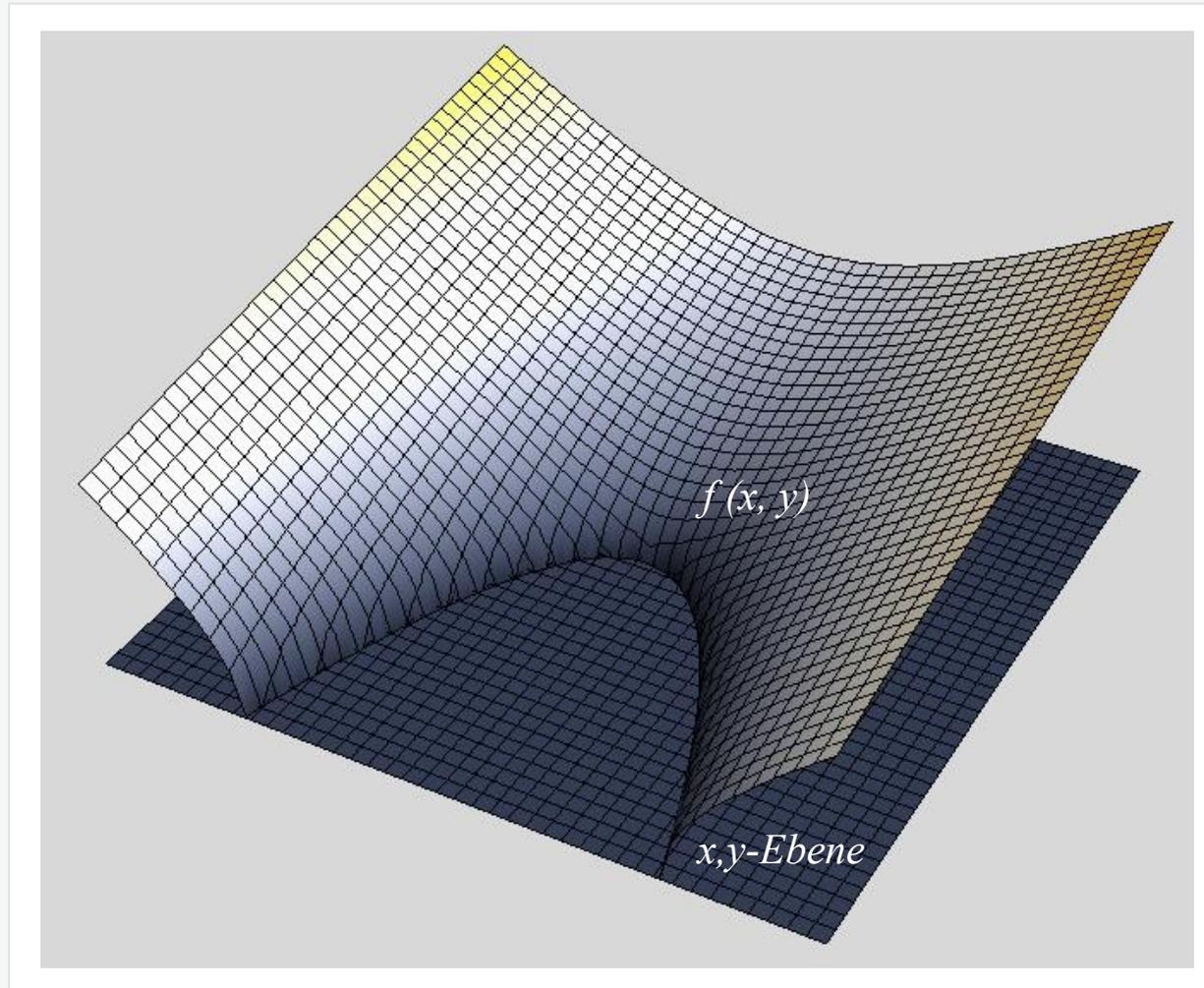


Abb. L23-1: Graphische Darstellung der Funktion $f(x, y) = (x^2 + y)^{1/2}$

$$f(x, y) = \sqrt{x^2 + y}, \quad D(f) = \{(x, y) \in \mathbb{R}^2, \quad y \geq -x^2\}$$

Definitionsbereich einer Funktion $f = f(x, y)$: Lösung 24

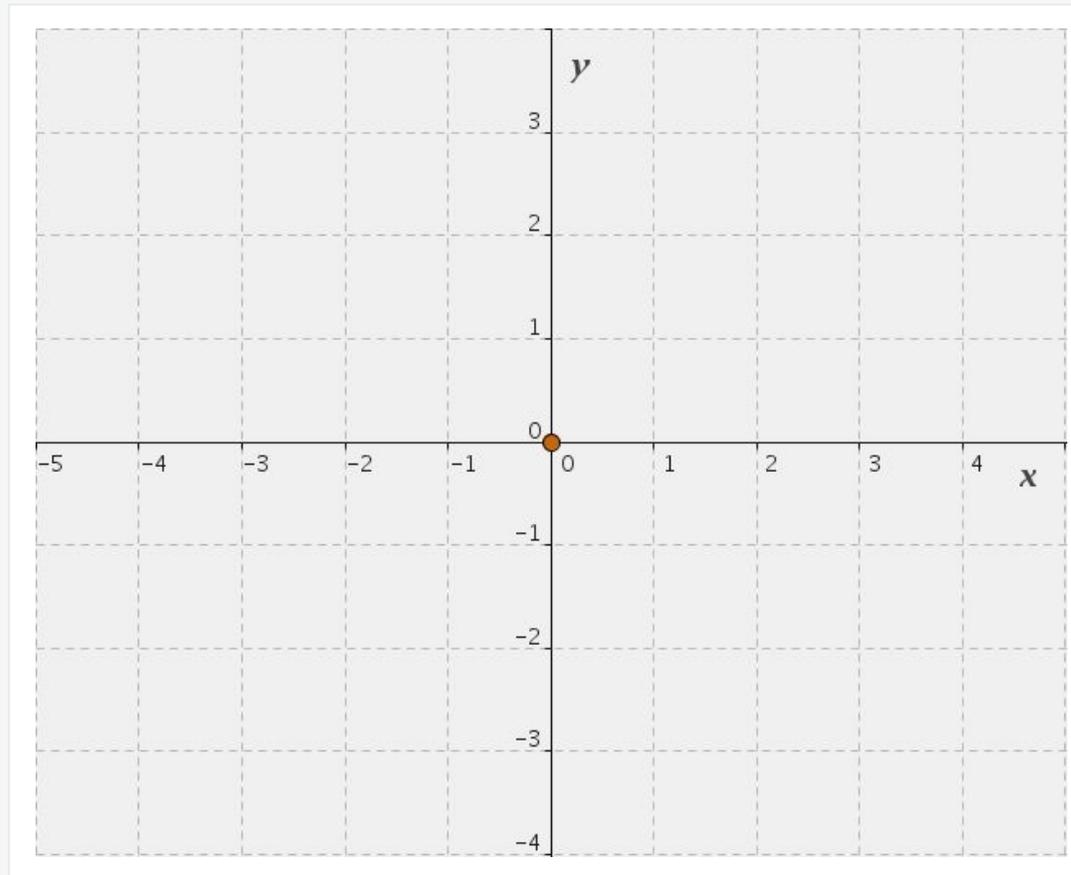


Abb. L24-1: Definitionsbereich der Funktion $f(x, y)$

$$f(x, y) = x^2 + y^2 + \frac{1}{x^2 + y^2}, \quad D(f) = \mathbb{R}^2 \setminus \{(0, 0)\}, \quad W(f) = (0, \infty)$$

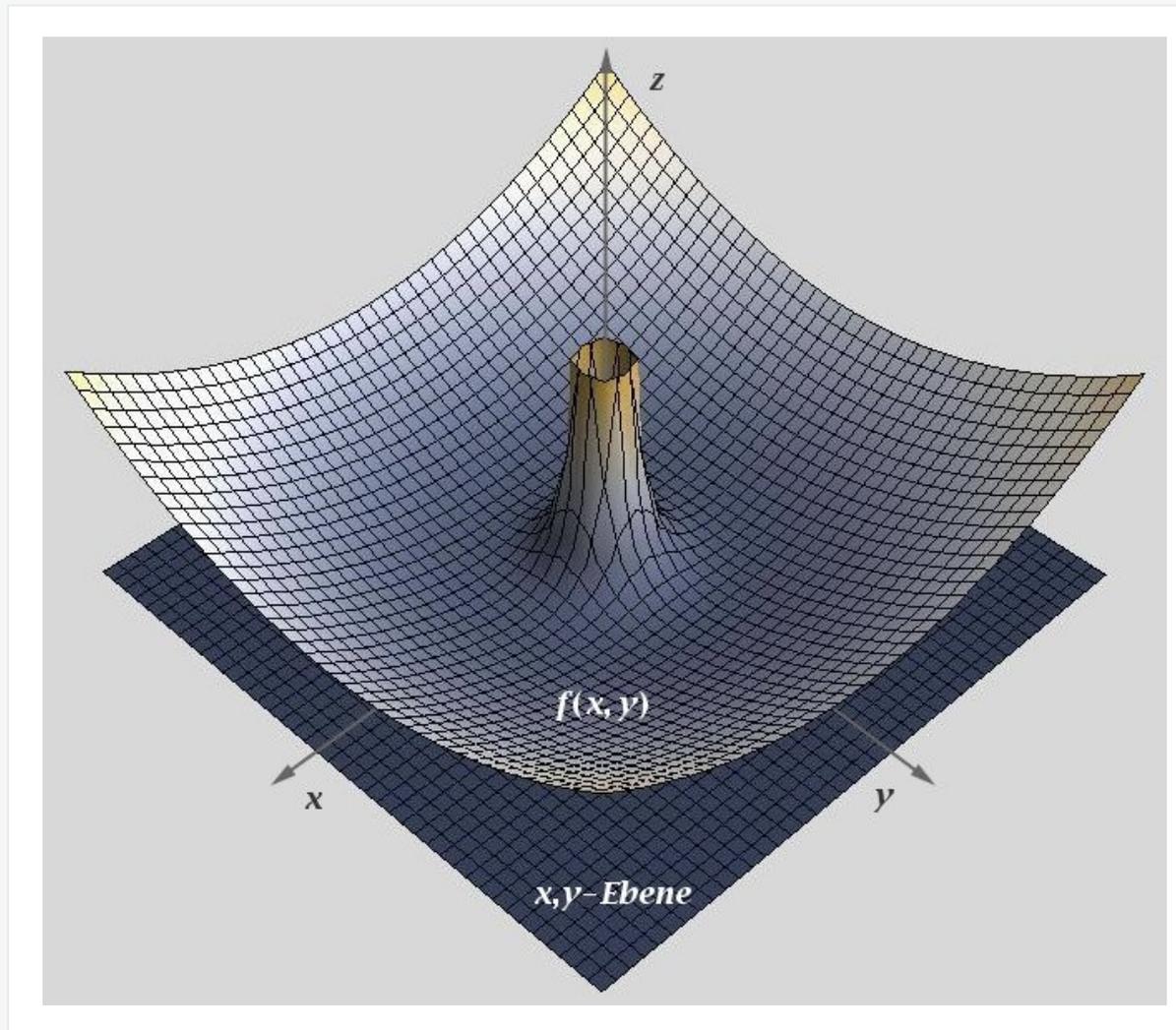
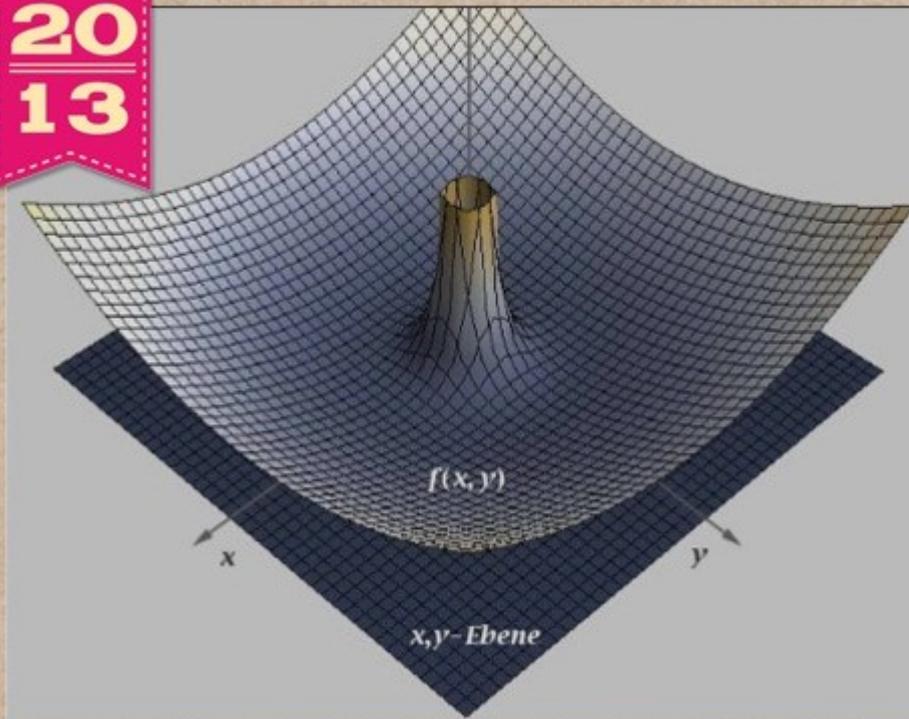


Abb. L24-2: Graphische Darstellung der Funktion $f(x, y)$

$$f(x, y) = x^2 + y^2 + \frac{1}{x^2 + y^2}$$

20
13



January

S	M	T	W	T	F	S
	1	2	3	4	5	
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

February

S	M	T	W	T	F	S
		1	2			
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

March

S	M	T	W	T	F	S
			1	2		
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

April

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

May

S	M	T	W	T	F	S
	1	2	3	4		
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

June

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

July

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

August

S	M	T	W	T	F	S
						1 2 3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

September

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

October

S	M	T	W	T	F	S
	1	2	3	4	5	
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

November

S	M	T	W	T	F	S
						1 2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

December

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				