

Gesucht ist der Gradient folgender Skalarfelder

Aufgabe 4: $\Phi(x, y) = x^2 + 2 \sin y$

Aufgabe 5: $\Phi(x, y) = -x^2 + 2 \cos y$

Aufgabe 6: $\Phi(x, y) = \sin^2 x \cdot \cos^2 y$

Aufgabe 7: $\Phi(x, y) = e^{-(x^2 + y^2)}$

Aufgabe 8: $\Phi(x, y) = \cos x \cdot \cos y \cdot e^{-(x^2 + y^2)}$

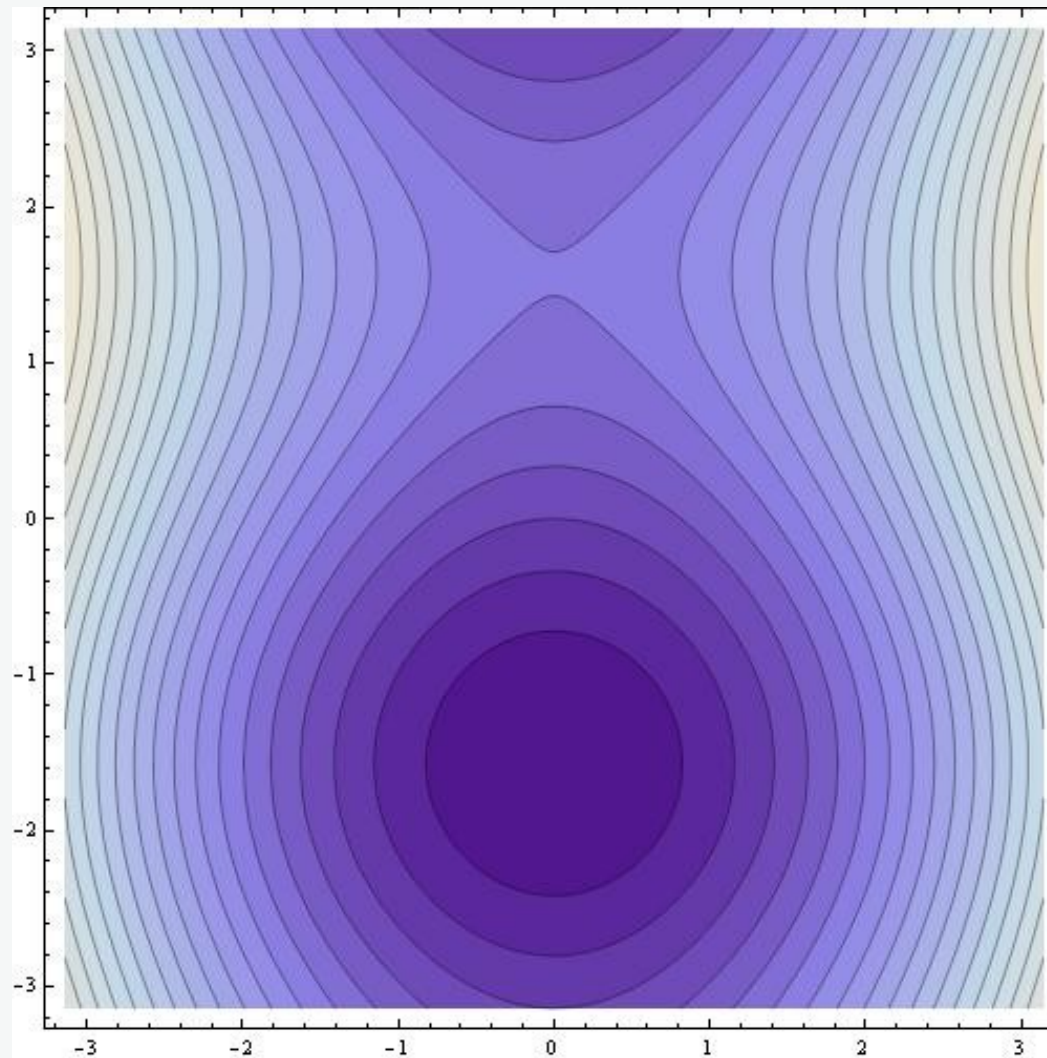


Abb. A4-1: Höhenliniendiagramm des Skalarfeldes $\Phi(x, y)$

$$\Phi(x, y) = x^2 + 2 \sin y$$

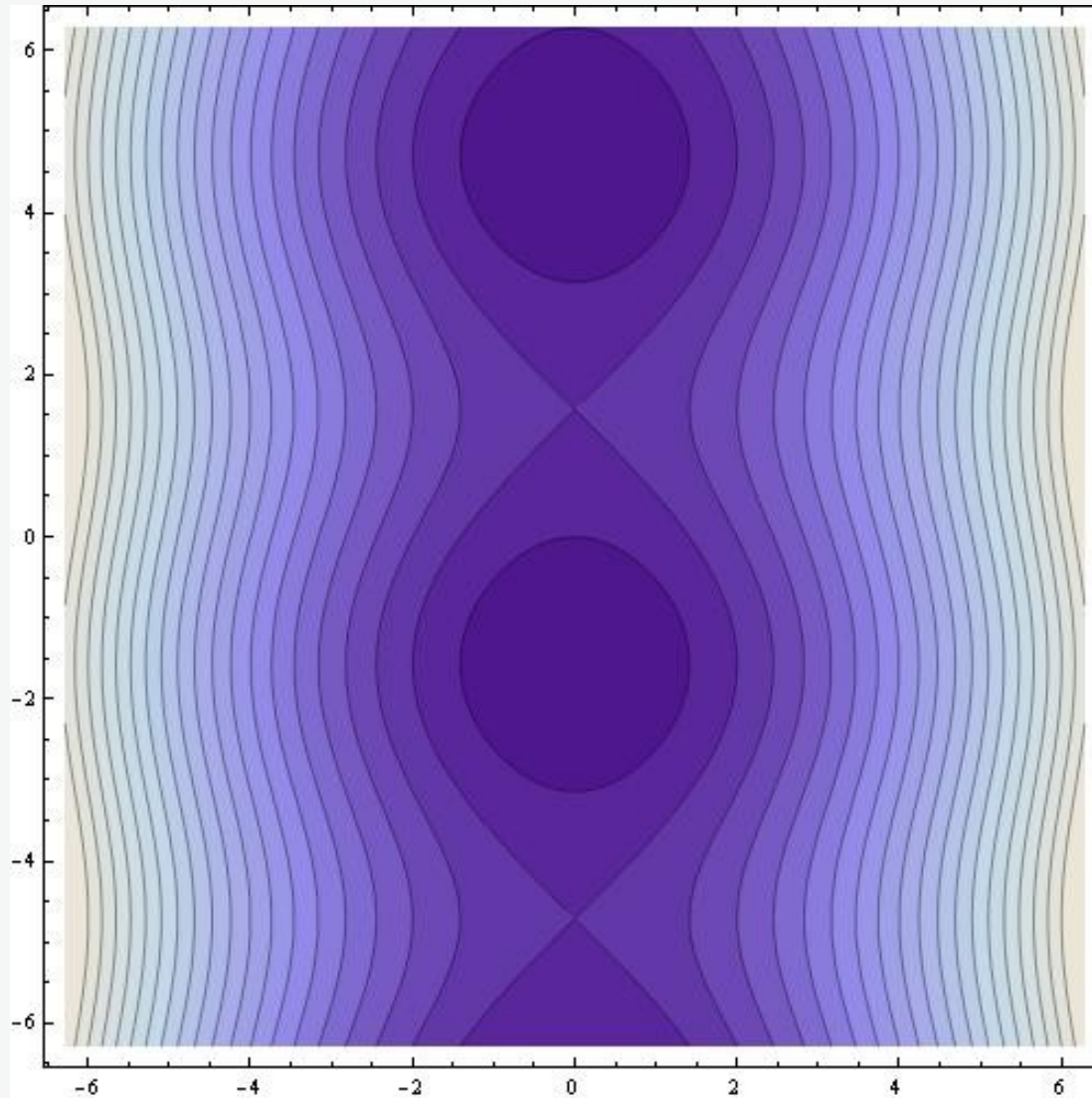


Abb. A4-2: Höhenliniendiagramm des Skalarfeldes $\Phi(x, y)$

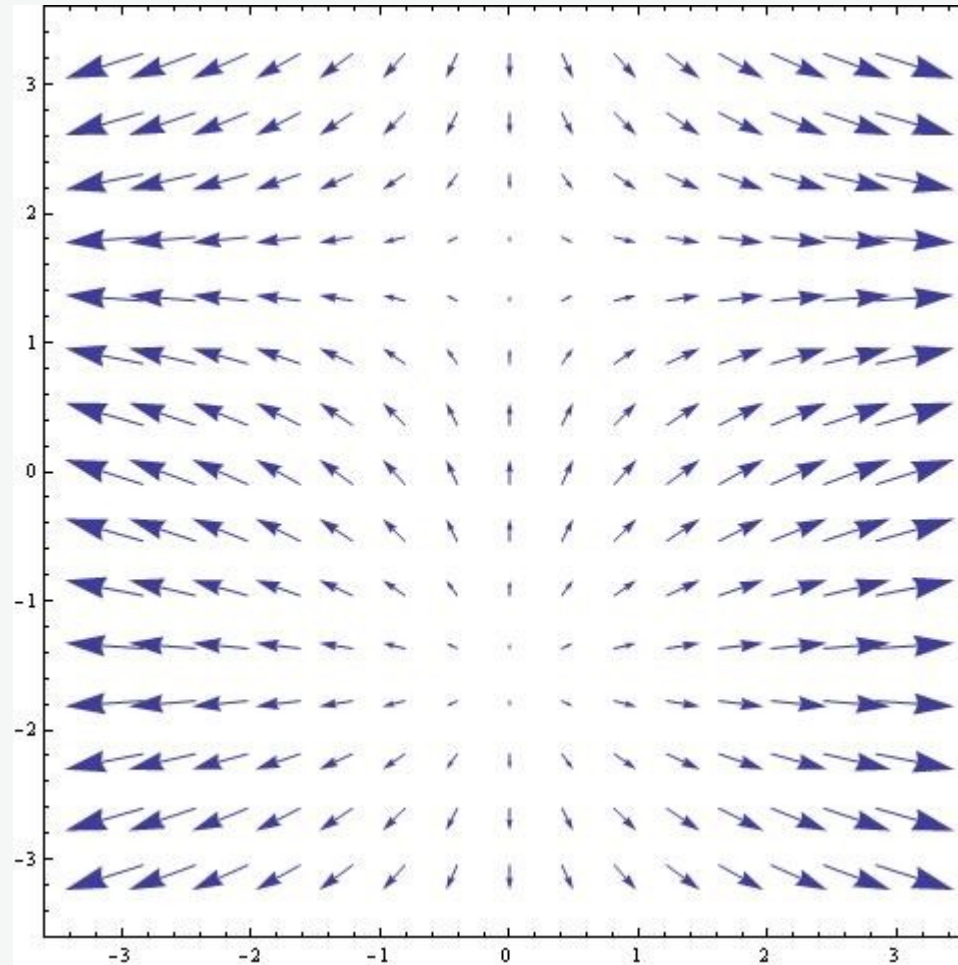


Abb. A4-3: Gradientenfeld des Skalarfeldes $\Phi(x, y)$

$$\Phi(x, y) = x^2 + 2 \sin y, \quad \text{grad } \Phi = 2x \cdot \vec{i} + 2 \cos y \cdot \vec{j}$$

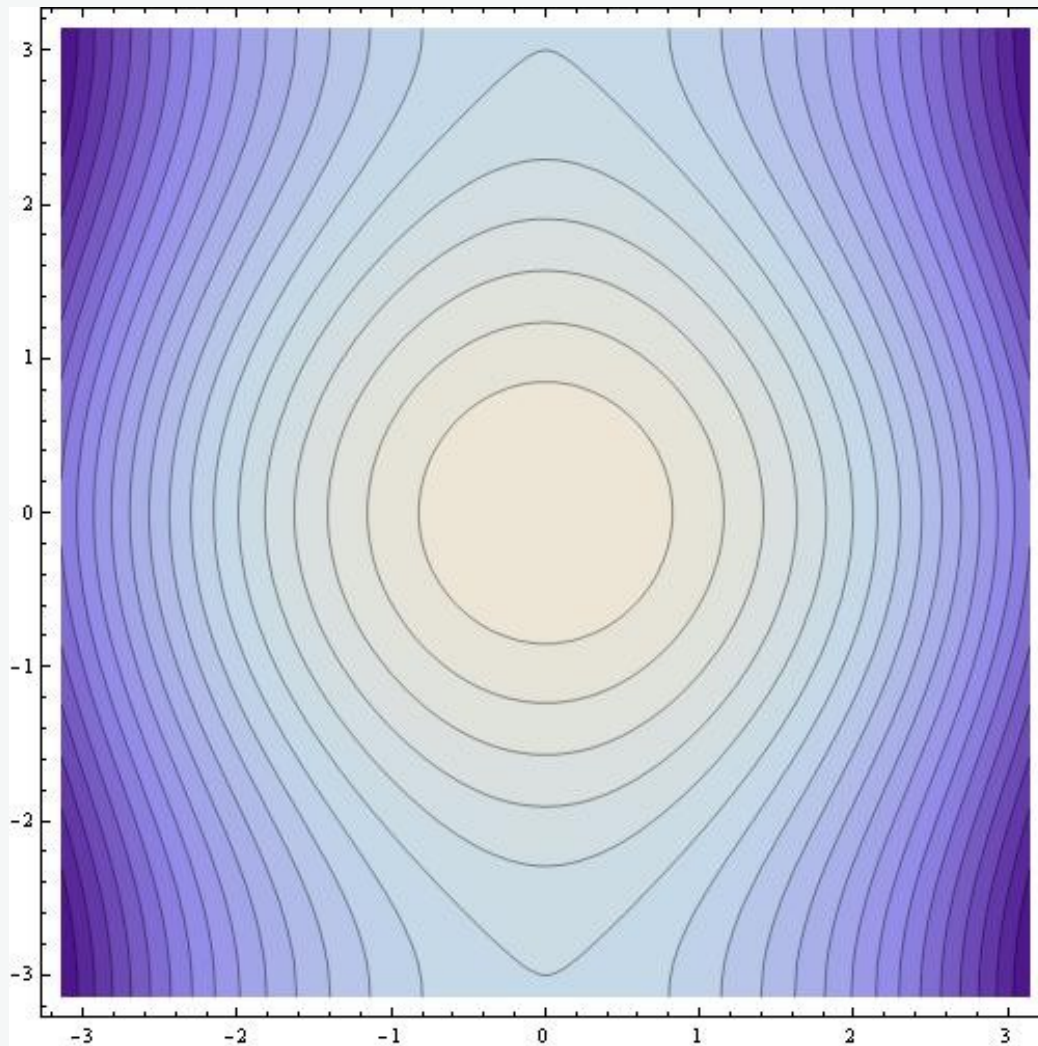


Abb. A5-1: Höhenliniendiagramm des Skalarfeldes $\Phi(x, y)$

$$\Phi(x, y) = -x^2 + 2 \cos y$$

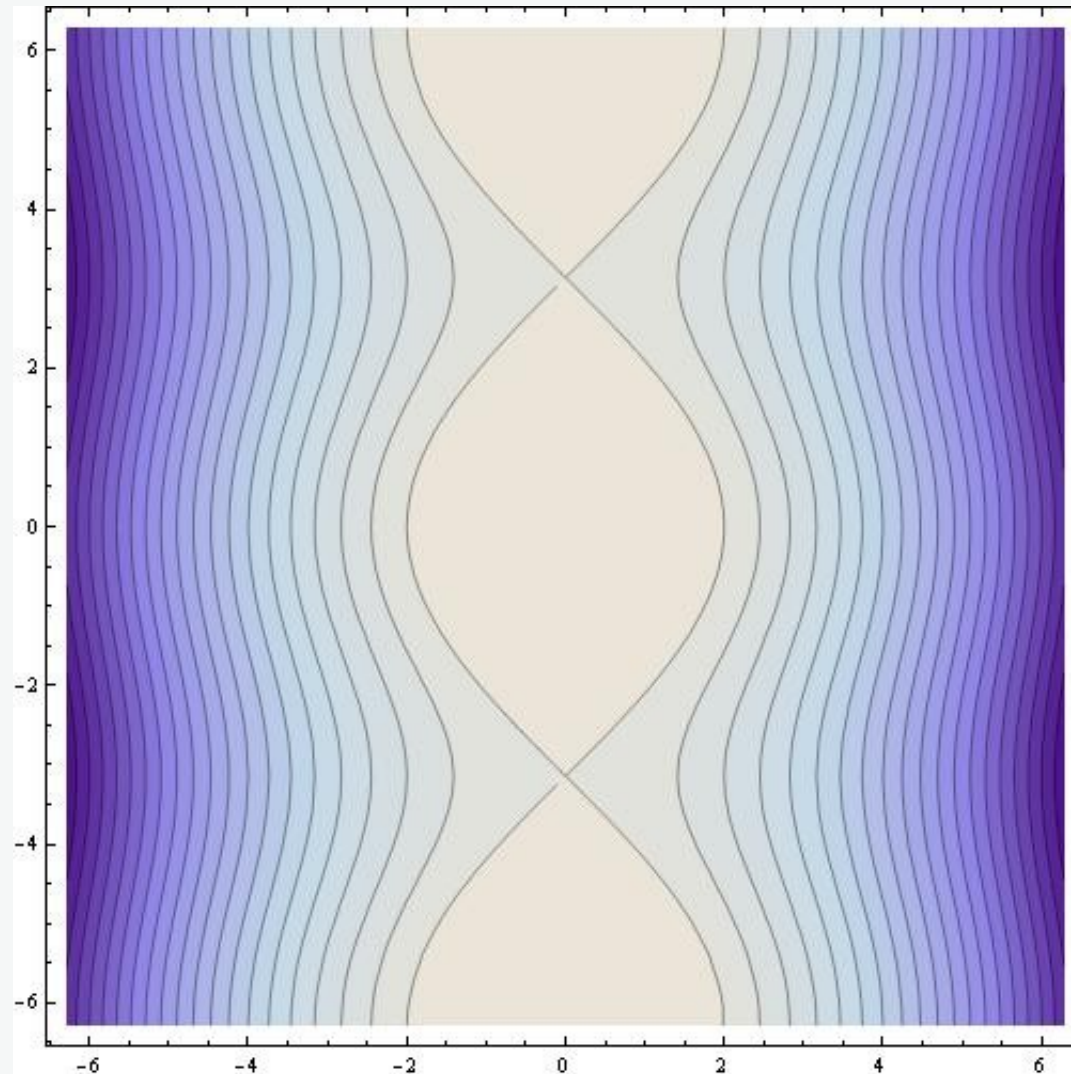


Abb. A5-2: Höhenliniendiagramm des Skalarfeldes $\Phi(x, y)$

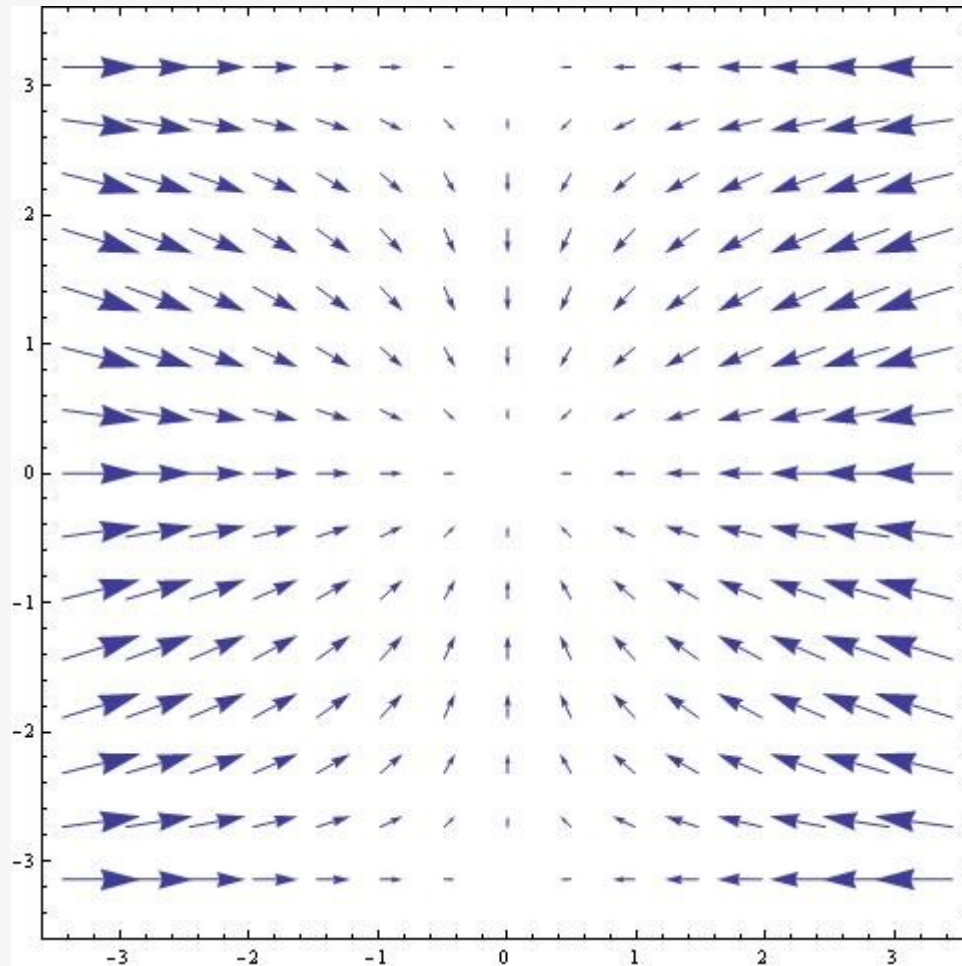


Abb. A5-3: Gradientenfeld des Skalarfeldes $\Phi(x, y)$

$$\Phi(x, y) = -x^2 + 2 \cos y, \quad \text{grad } \Phi = -2x \cdot \vec{i} - 2 \sin y \cdot \vec{j}$$

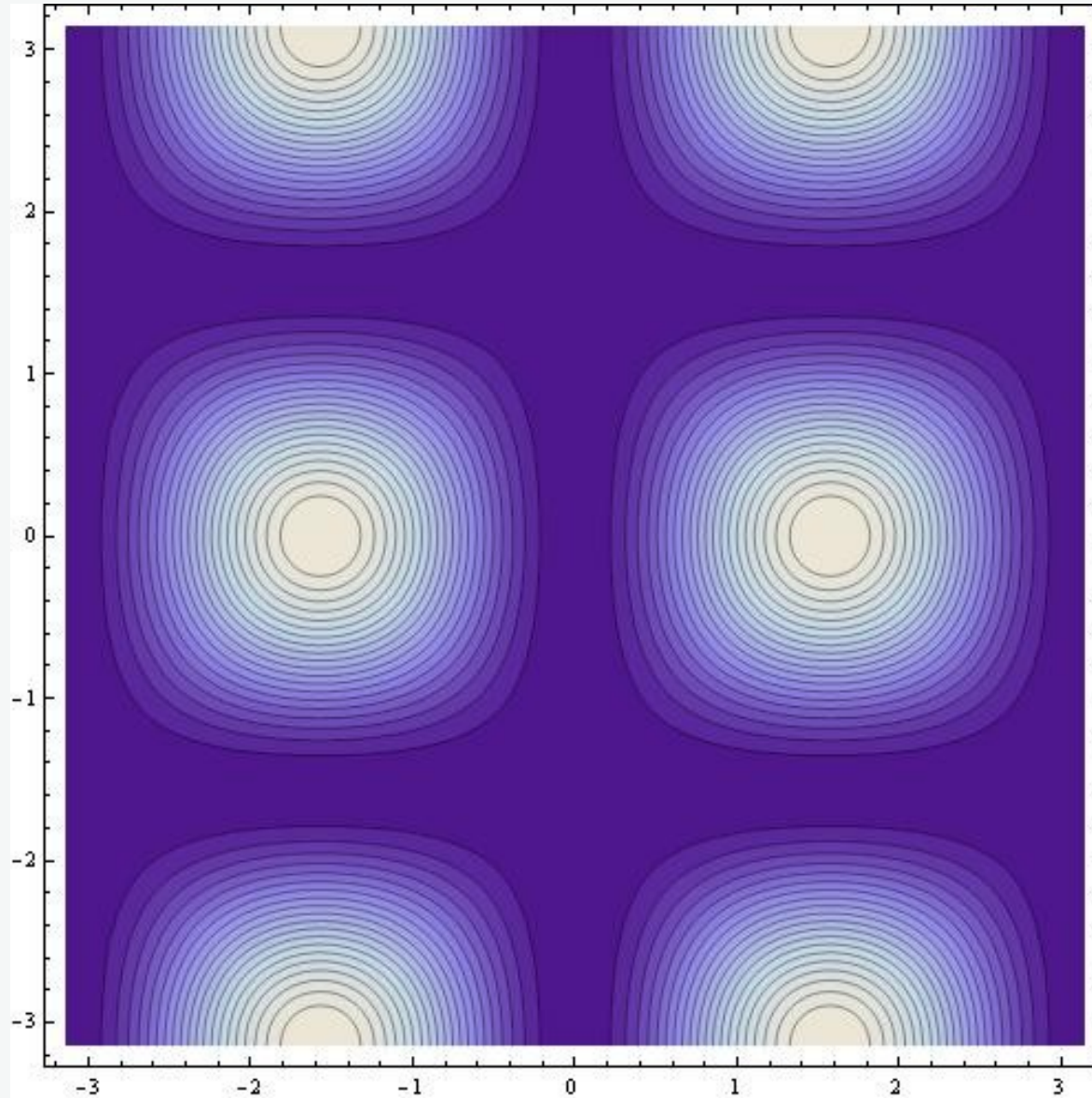


Abb. A6-1: Höhenliniendiagramm des Skalarfeldes $\Phi(x, y)$

$$\Phi(x, y) = \sin^2 x \cdot \cos^2 y$$

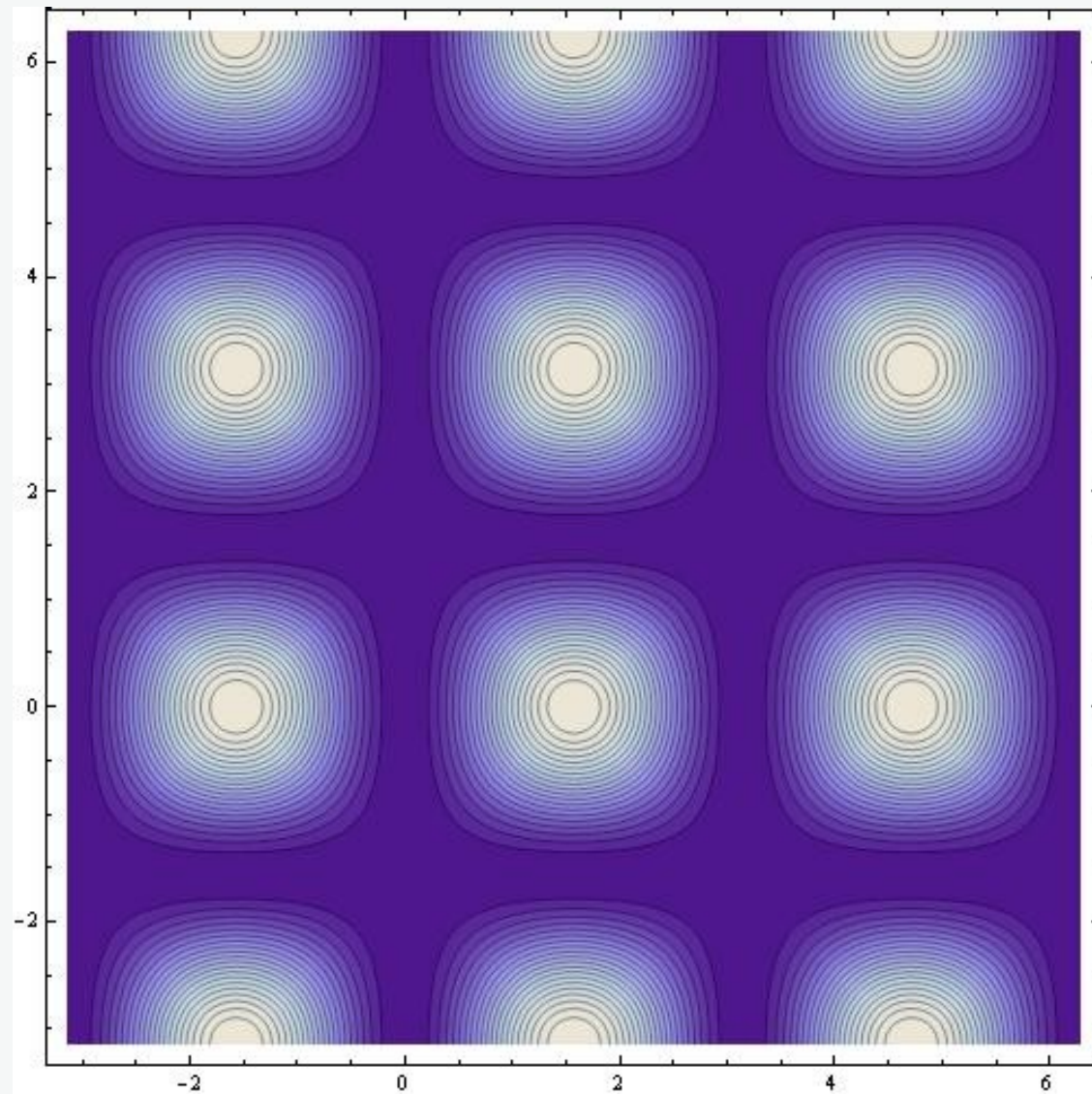


Abb. A6-2: Höhenliniendiagramm des Skalarfeldes $\Phi(x, y)$

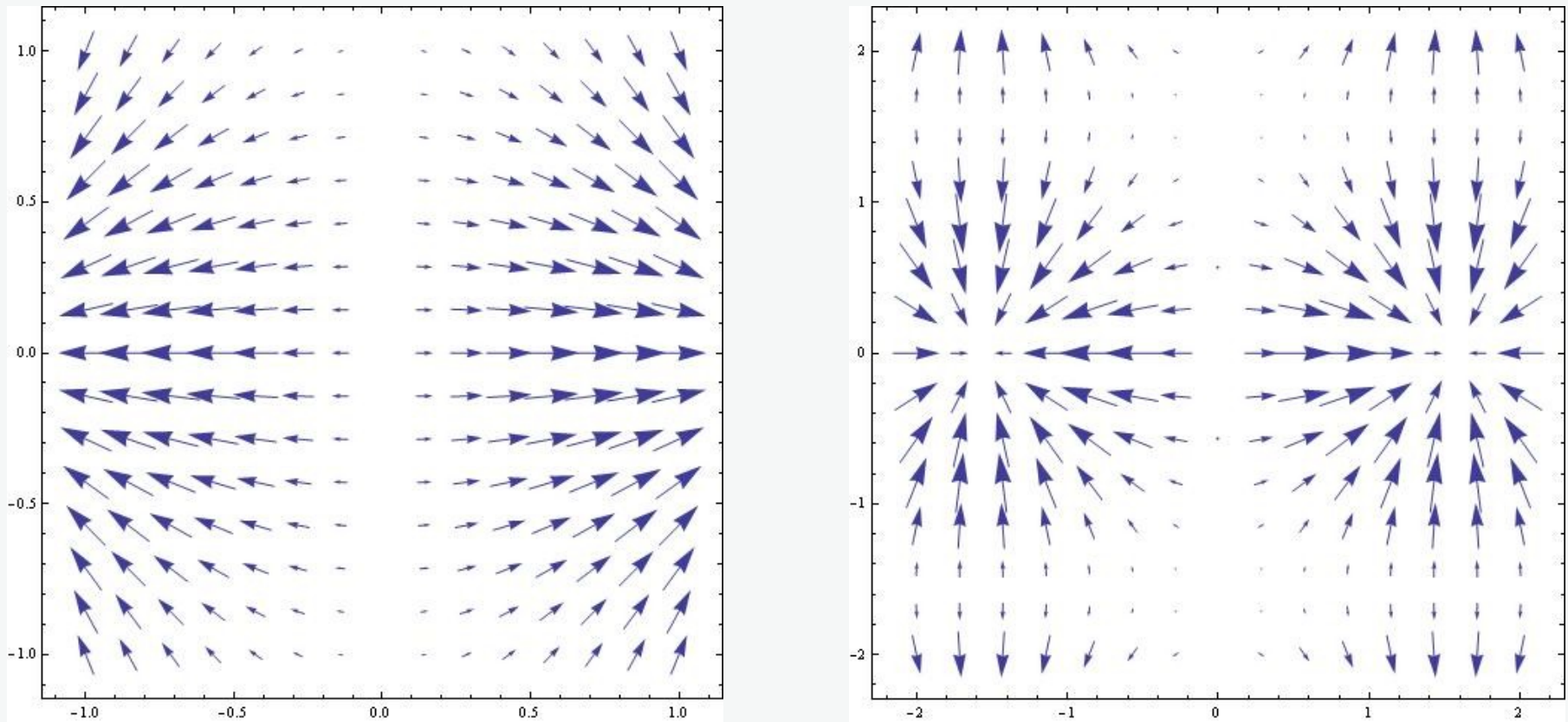


Abb. A6-3: Gradientenfeld des Skalarfeldes $\Phi(x, y)$

$$\Phi(x, y) = \sin^2 x \cdot \cos^2 y$$

$$\text{grad } \Phi = \sin 2x \cos^2 y \cdot \vec{i} - \sin^2 x \sin 2y \cdot \vec{j}$$

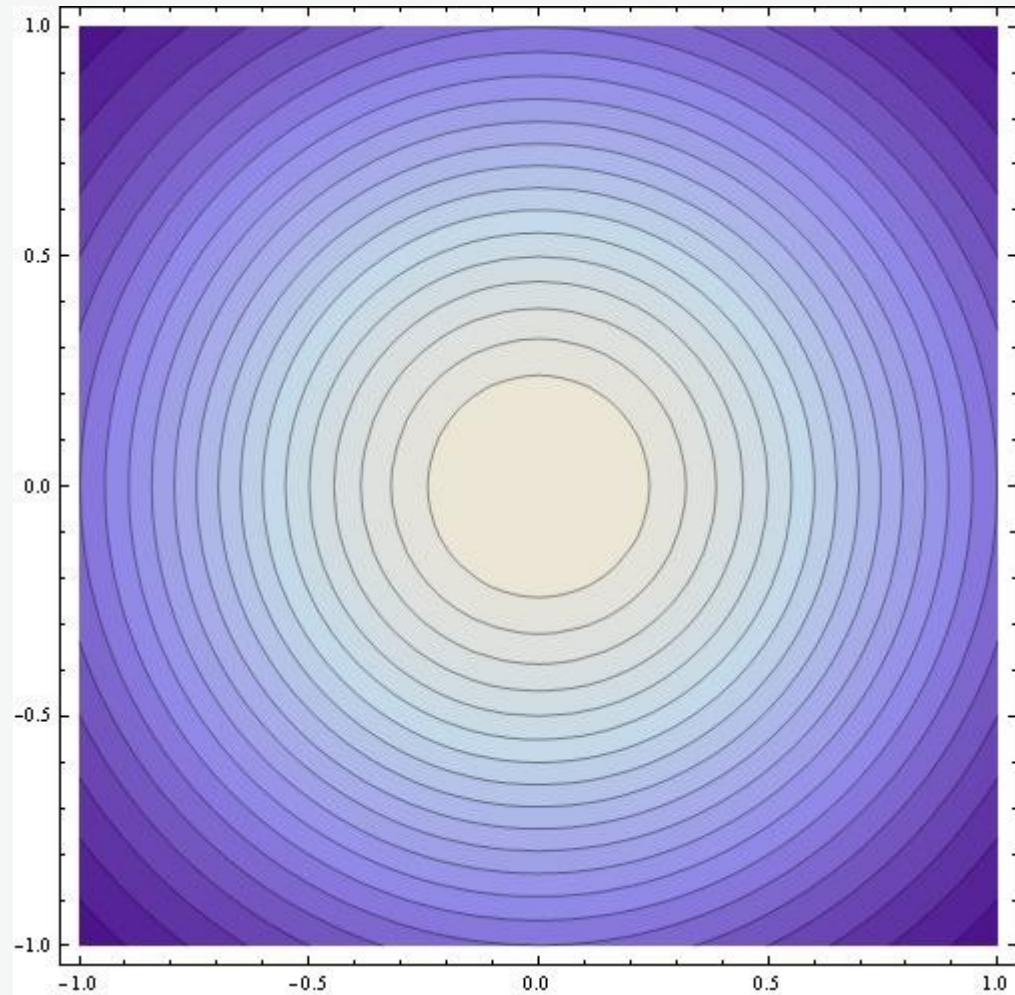


Abb. A7-1: Höhenliniendiagramm des Skalarfeldes $\Phi(x, y)$

$$\Phi(x, y) = e^{-(x^2 + y^2)}$$

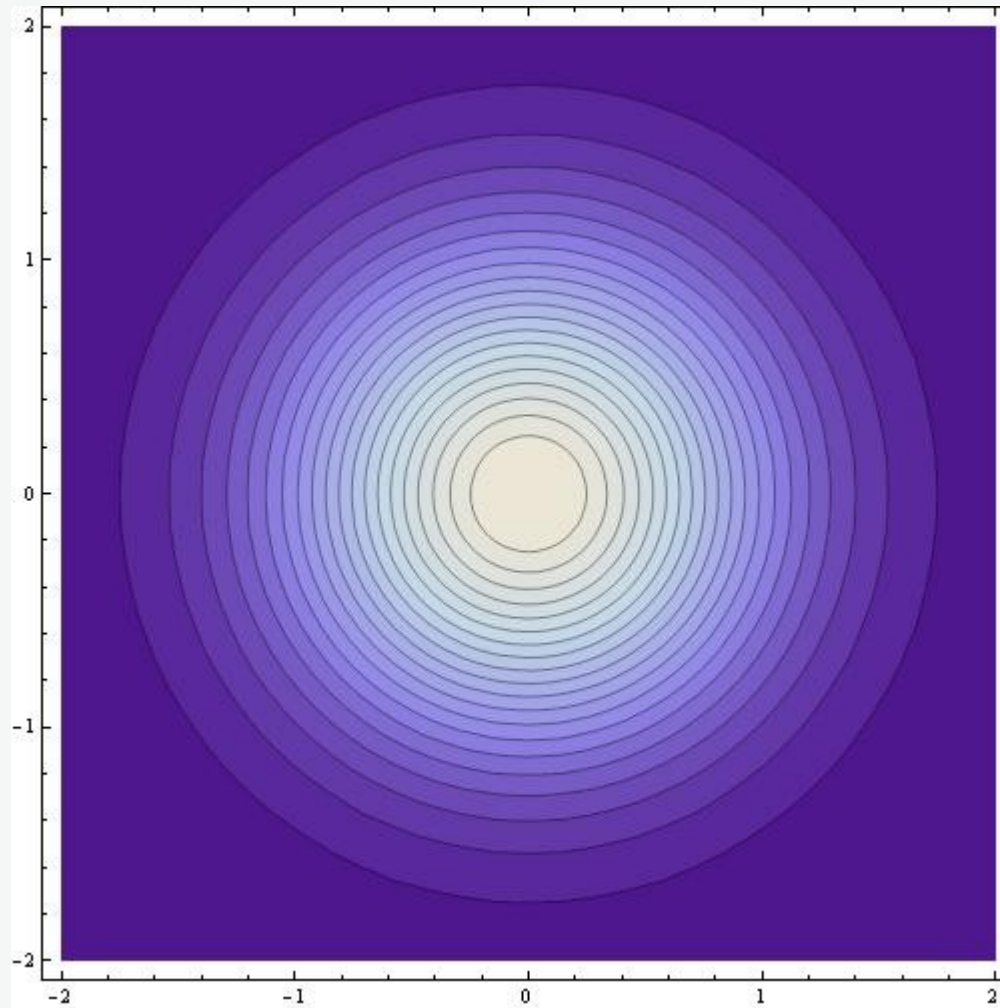


Abb. A7-2: Höhenliniendiagramm des Skalarfeldes $\Phi(x, y)$

Gradientfeld: Aufgabe 7

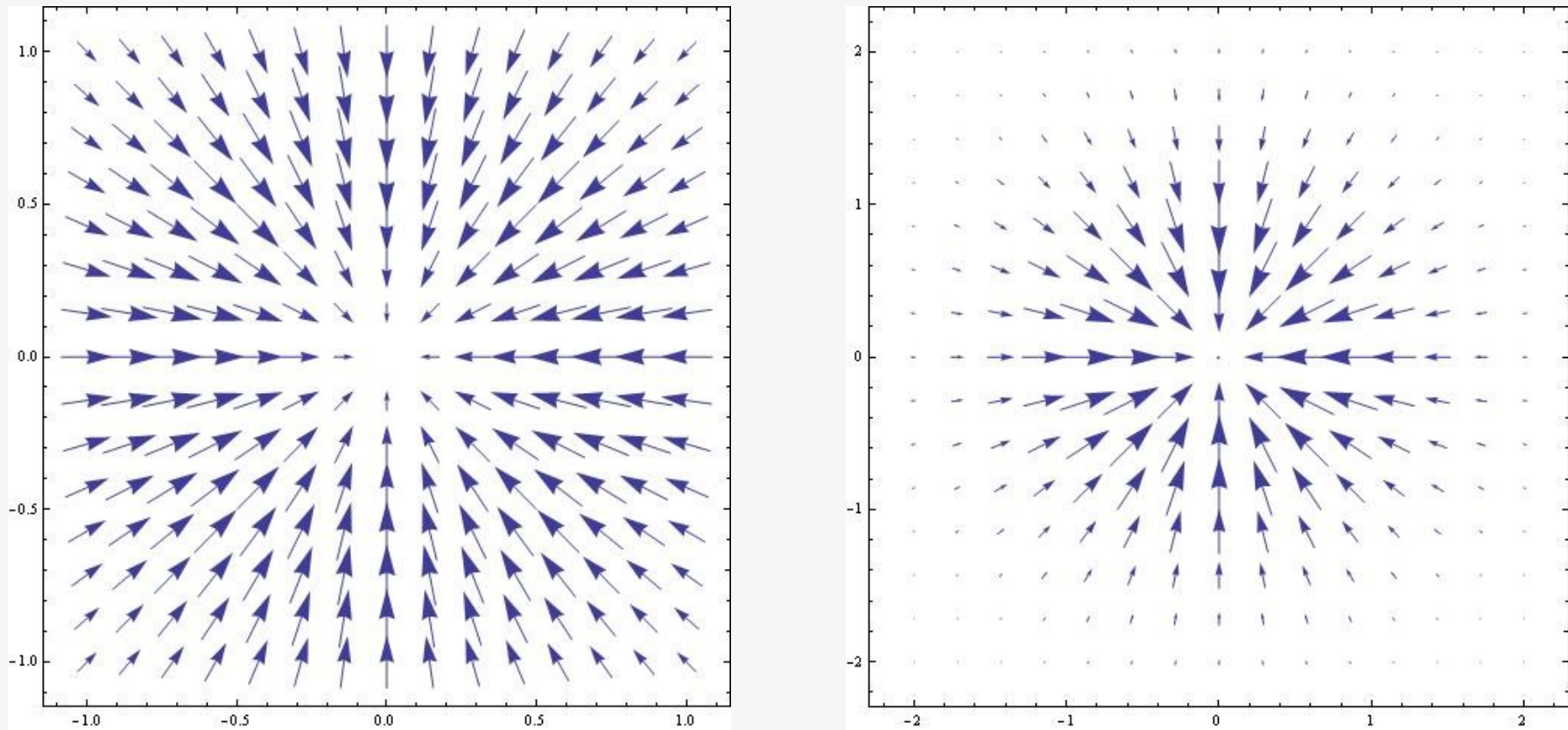


Abb. A7-3: Gradientenfeld des Skalarfeldes $\Phi(x, y)$

$$\Phi(x, y) = e^{-(x^2 + y^2)}, \quad \text{grad } \Phi = -2 e^{-(x^2 + y^2)} (x \vec{i} + y \vec{j})$$

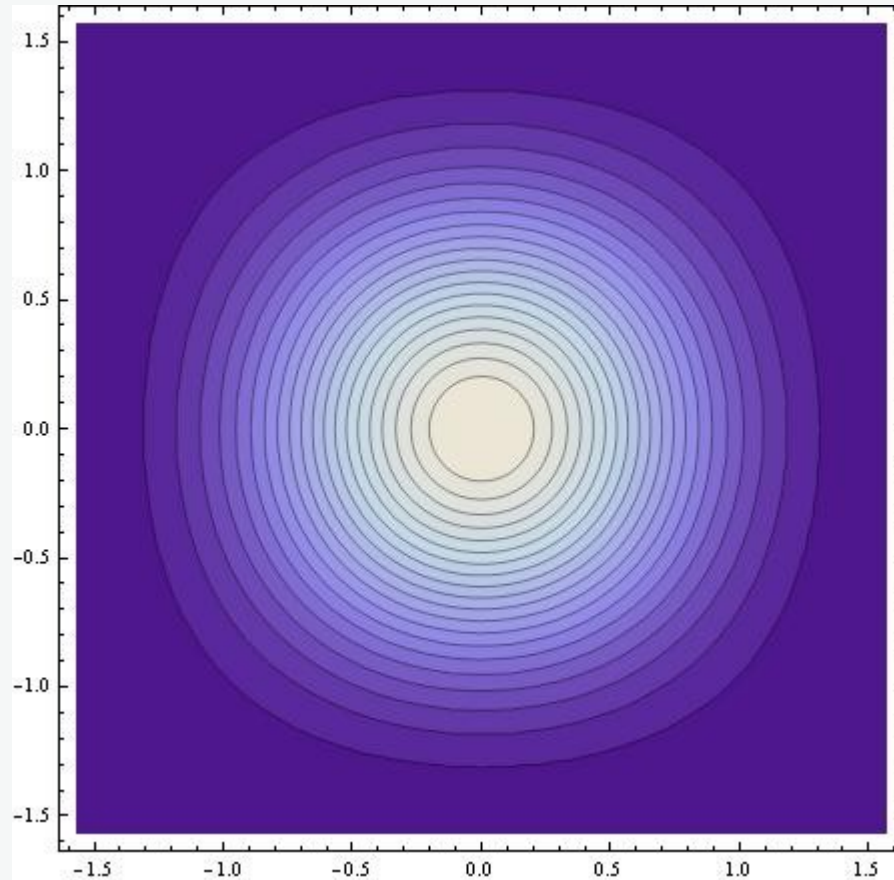


Abb. A8-1: Höhenliniendiagramm des Skalarfeldes $\Phi(x, y)$

$$\Phi(x, y) = \cos x \cdot \cos y \cdot e^{-(x^2 + y^2)}$$

Gradientfeld: Aufgabe 8

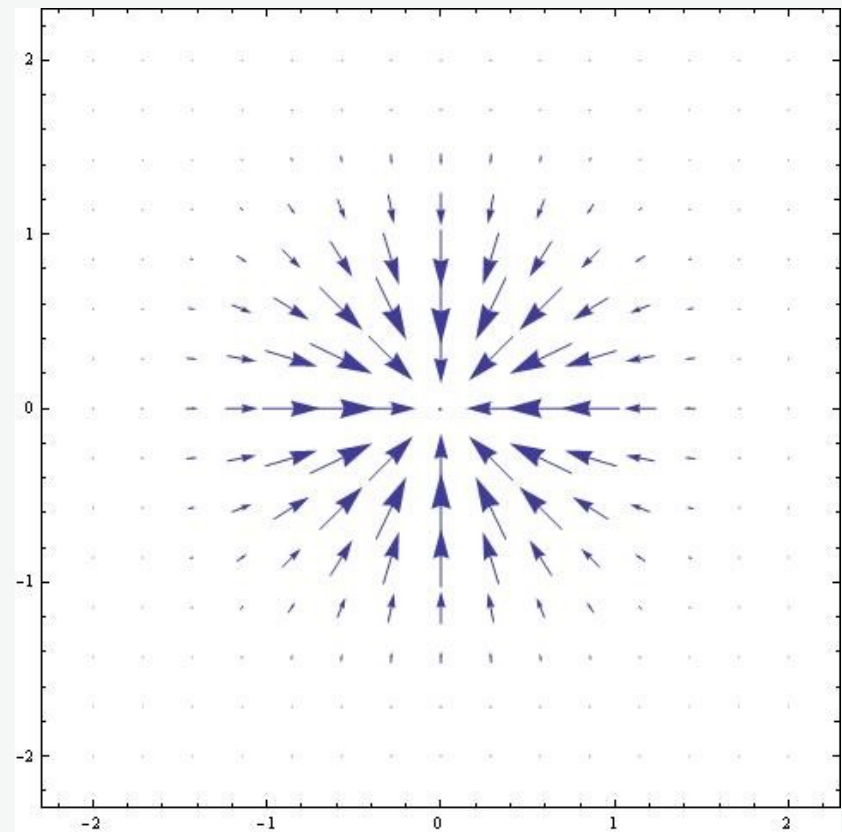
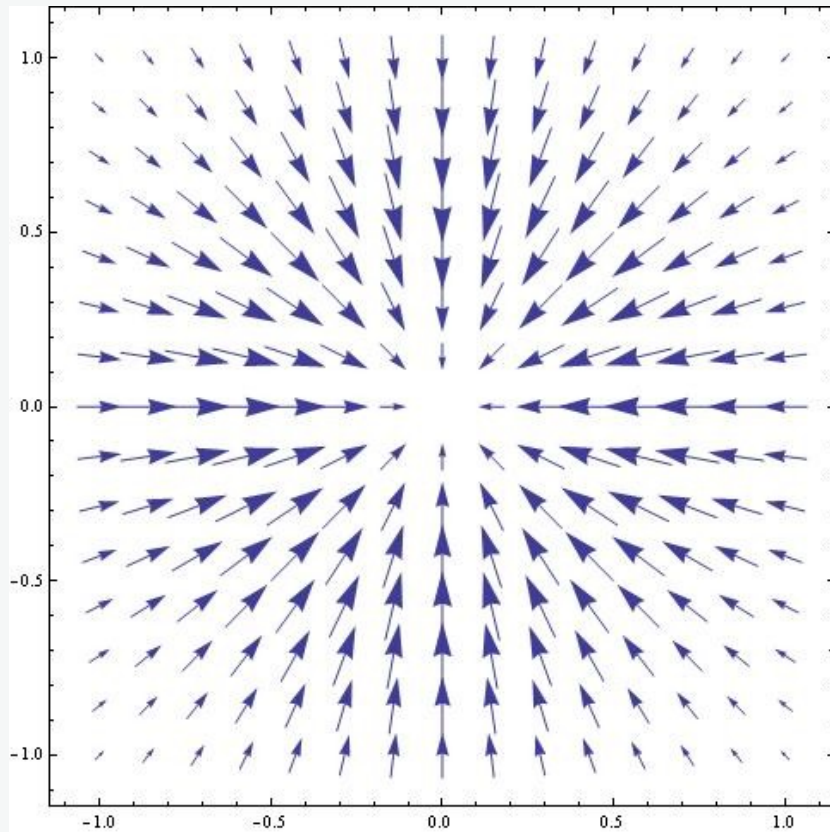


Abb. A8-2: Gradientenfeld des Skalarfeldes $\Phi(x, y)$

$$\Phi(x, y) = \cos x \cdot \cos y \cdot e^{-(x^2 + y^2)}$$

$$\text{grad } \Phi = -\left[\cos y (2x \cos x + \sin x) \cdot \vec{i} + \cos x (2y \cos y + \sin y) \cdot \vec{j} \right] e^{-(x^2 + y^2)}$$